NYC Environmental Protection

Major Issues with AQ/NCG Draft RI

Newtown Creek Superfund Site

February 21, 2017

Draft RI Report is Both Materially Incomplete and Inaccurate

NYC Environmental Protection

- AQ/NCG RI is incomplete and inaccurate and cannot be approved until required corrections are made and and missing information is provided
  - Significant revision of the AQ/NCG RI is needed including inclusion of additional data and data from upland sites
  - The currently proposed review process is inadequate
- Major deficiencies in the AQ/NCG RI
  - Upland sites impacts are not considered in the AQ/NCG RI
  - AQ/NCG RI is biased to overly focus on CSOs and MS4s
  - Impacts of NAPL and groundwater are mischaracterized by AQ/NCG RI
  - The Conceptual Site Model (specifically inclusion of groundwater and NAPL impacts) needs to be revised and updated

AQ/NCG RI has major gaps to be filled before approval

Peer Review Is Needed

Schedule Allows For Approval of RI/FS In 2019

Status of AQ/NCG RI – NYCDEP Assessment

NYC Environmental Protection

- ☐ Executive Summary (Incomplete)
- ☐ Chapter 1: Introduction
- ☐ Chapter 2: Program Summary
- ☐ Chapter 3: Site Setting (Incomplete)
- ☐ Chapter 4: Nature and Extent of Contamination – (Incomplete)
- ☐ Chapter 5: Sources – (Incomplete)
- ☐ Chapter 6: Fate and Transport – (Incomplete)
- ☐ Chapter 7: Risk Assessment – (Unsupported Focus On CSOs/MS4s)
- ☐ Chapter 8: CSM – (Incomplete)
- ☐ Chapter 9: Conclusions – (Incomplete)
  - ☐ Appendix A – Figures and Tables
  - ☐ Appendix B – Data Summary Report
  - ☐ Appendix C – NAPL Evaluation
  - ☐ Appendix D – Gas Ebullition Evaluation
  - ☐ Appendix E – Point Source Evaluation
  - ☐ Appendix F – Groundwater Evaluation
  - ☐ Appendix G – FMRM
  - ☐ Appendix H – BHHRA
  - ☐ Appendix I – BERA
  - ☐ Appendix J – DAR Additions

Upland Sites Need to be Included in the RI/FS

Upland Site Impacts Are Not Discussed in the AQ/NCG RI

- Throughout the AQ/NCG RI the historical and ongoing impact of upland sites on the Creek is not discussed.
- Current conditions in the Creek are attributed to point sources and historical discharges (not defined)
- Impacts of upland sites on the Creek are neither described, investigated, nor evaluated to any significant extent
  - Current Impacts not considered
- AQ/NCG RI does not consider upland site remediation is necessary to prevent recontamination of the Creek

Assessment of the Impact of Upland Site is Needed

NYC Environmental Protection

- Inconsistency in evaluating ongoing upland sources
  - AQ/NCG RI report focuses on CSOs and MS4s (upland inputs)
  - Upland sites are considered outside of scope and any impacts are not assessed in AQ/NCG RI
- EPA target is ~2027 for IRM in place for upland sites, **but no mechanism for inclusion in RI/FS**
  - NYSDEC and EPA upland coordination is unclear
  - Recently EPA/CDM identified 4 “likely” impacting sites (not in AQ/NCG RI)
    - Former Paragon Oil Terminal, Former Pratt Oil Works, Scholes Street Holder Station (Greenpoint Energy Center (National Grid), 22 “unknown” sites
  - Upland sites and sources not evaluated or understood to CERCLA rigor
  - Remedies/alternatives not evaluated under the NCP criteria as required by CERCLA (e.g. Frito Lay site appears to be impacting after remediation)
  - Many sites along the Creek are not under NYSDEC order
  - AQ/NCG considers adjacent sites impacting the Creek as “outside the study area”

Uncharacterized ongoing impacts from upland sites must be formally included in the CERCLA RI/FS process – Schedule and process for inclusion of upland sites in the RI/FS is needed

Examples of Uplands Assessment Deficiency

- Discussion of NCG upland site activities is limited and is provided by individual parties
  - Descriptions for non-NCG sites at least include a description of what contaminant groups are present due to upland activities. **That is not provided for NCG sites**
  - Discussion of upland sites focuses only on the history of activities, **not COPCs:**

    "Copper smelting and refining within the Newtown Creek industrial area commenced in the late 1800s. Feedstock consisted mainly of ore concentrates. The copper smelting process involved high temperature treatment of the copper concentrate in furnaces and converter vessels to separate the copper from impurities. The copper from the smelter was further purified by the refining process, which used fire refining in furnaces or electrolytic refining in tanks of copper sulfide and sulfuric acid. The resulting pure copper was then cast or shaped as desired. Used solutions from the electrolytic refining process were used to produce commercial products, such as copper sulfate" **Description in AQ/NCG RI for PDRC**
- Nature and extent of COPCs measured at upland sites need to be discussed
  - TPAH, TPCB, Cu, elevated TOC and TPH and other contaminants have been documented at upland sites
  - NYSDEC programs are underway for most NCG properties. Results of contamination found upland should be included in the RI to provide an assessment of historical and ongoing discharges from those upland sites
- Pathways and impacts to the Creek need to be discussed

Examples of Uplands Assessment Deficiency

- Current conditions in the Creek are not attributed to obvious upland historical impacts
- "Historically, contaminant loads to the Study Area were much greater, as evidenced by the higher contaminant concentrations in subsurface sediment. The current distribution of contaminants in the sediment column of the Study Area is thus due to uncontrolled historical and ongoing sources, historical dynamic fate and transport processes, and changes in contaminant load over time; therefore, the locations of impacts observed today <u>cannot necessarily be directly linked to proximate upland sites</u>" – AQ/NCG RI
  - However closer examination of surface sediment data shows:
    - Elevated Copper concentrations in the surface sediment of the Creek are coincident with the location of former copper smelter upland site
    - Elevated TPCB concentrations in the surface sediment of the Creek are coincident with the location of the former MGP site and other upland Sites in English Kills with known PCB impacts
    - Elevated TPAH concentrations in the Creek are coincident with the location and discharge area of two former MGP sites in Turning Basin and English Kills

Examples of Uplands Assessment Deficiency

NYC Environmental Protection

- The AQ/NCG RI does not provide explanation of likely upland site impacts on the elevated concentrations in the sediment, including the subsurface and native sediments
  - Elevated TPAH concentrations (> 1000 mg/kg and as high as 12,000 mg/kg) are measured **in the native materials** of the sediments adjacent to the National Grid former-MGP Site in the Turning Basin and in the English Kills area likely impacted by Equity works former-MGP Site.
    - "Limited number of samples exceeding 10 mg/kg are found in lower CM2+/English Kills, where higher subsurface sediment concentrations are also found" –AQ/NCG RI
    - The text further states that, "Additional discussion of the subsurface sediment and native material TPAH concentrations in this area is provided in Appendix C." **However, no discussion is provided in Appendix C**.
- Elevated concentrations in the ongoing NCG point source discharges are not discussed
  - For example, the highest Copper concentrations are measured in National Grid's point source discharge (1260 to 1700 mg/kg -Average 1500 mg/kg), which are one order of magnitude higher than the concentrations listed by AQ/NCG in the RI report.
  - AQ/NCG RI is biased in describing the sources from their outfalls as compared to other outfalls.

Impacts from Ongoing Seeps Ignored in the AQ/NCG RI

NYC Environmental Protection

- "No observable seeps were documented during the Phase 1 and Phase 2 field activities… Ongoing contaminant seeps, if present, could represent a localized source to the creek. However, such loads are not considered significant to the overall Study Area." - AQ/NCG RI
- AQ/NCG has documented NAPL seeps from their upland sites during Phase2 work plan development and also during ebullition survey.
- Ongoing NAPL seeps to the Creek from NCG Sites and other upland sites.
  - Former Pratt Oil Works (Middle Reach) Exxon Mobil Property (Remedial Action completed)
  - Greenpoint Energy Site (Turning Basin) National Grid Property
  - Manhattan Poly Bag (English Kills) Non-NCG Property
  - Frito Lay Site (English Kills) Non-NCG Property (Remedial Action completed)
  - Properties in East Branch
- Contaminant Seeps from upland sites are dismissed as unimportant without any characterization
  - Seeps should be sampled to understand the nature and extent of COPCs and impacts on the Creek
  - Properties listed above are not part of any planned future investigation to assess impacts on the Creek. AQ/NCG FS proposal is focused on properties with potential for shoreline erosion
- Presence of COPCs in the NAPL/seeps and the possible pathways of entering the Creek should be discussed in the RI/FS
- Without information on this potentially significant source the RI/FS is incomplete

Summary of AQ/NCG RI Uplands Assessment Deficiency

NYC Environmental Protection

- The RI/FS should summarize the nature of contamination in the upland sites
- Ongoing impacts from upland sites should be assessed and quantified in the RI/FS
- Pathways of how the contamination from the upland site impacts the Creek must be discussed
- Uncharacterized ongoing impacts from upland sites must be formally included in the CERCLA RI/FS process
- A schedule for inclusion of upland sites in the RI/FS is needed

Without This Information The RI/FS Is Incomplete

AQ/NCG RI Focuses Only on CSOs and MS4s

Mischaracterization of Impact of Point Sources

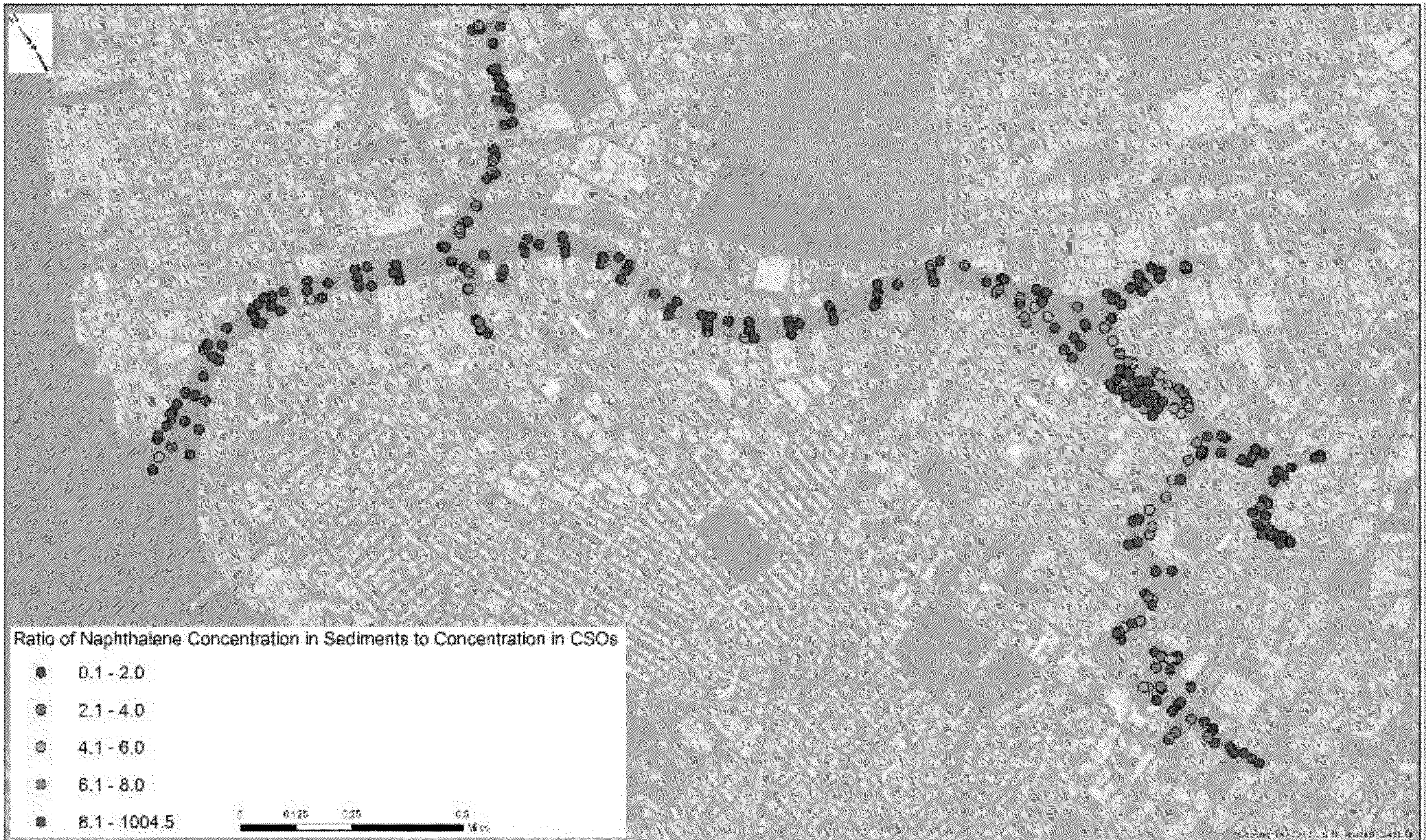
NYC Environmental Protection

- AQ/NCG RI attributes COPCs in the surface/subsurface sediments to CSOs and MS4s
- AQ/NCG RI ignores the data collected from point sources which unequivocally shows that CSOs and MS4s cannot generate the magnitude of contamination measured in the Creek.
- AQ/NCG RI fails to look at reference areas with CSOs and MS4s as a line of evidence which shows that CSOs and MS4s cannot be responsible for the elevated COPC concentrations measured in the surface and subsurface sediments of the Creek
- The CSM developed by AQ/NCG is flawed and fails to explain the sources of different COPCs to the sediments of the Creek.
  - The TPAH concentrations in surface sediments of the Creek are orders of magnitude higher than the ones measured in CSOs and MS4s
  - The AQ/NCG RI fails to account for presence of NAPL in the sediments, ongoing inputs from upland Sites as a significant source of COPCs to the Creek.
  - The AQ/NCG RI concedes that the TPCB and Copper concentrations in the Creek surface/subsurface sediments cannot be explained by CSOs and MS4s, but provides no other explanation for the elevated levels.
- The AQ/NCG RI also attributes toxicity to CSO and MS4s despite contrary results from reference area waterbodies with similar point source characteristics and CSO history.

Examples of Mischaracterization of Point Sources in the AQ/NCG RI

- AQ/NCG RI relies on unsupported speculation in an attempt to attribute COPC concentration in surface sediments to CSOs and MS4s
  - "Surface sediment concentrations in the upstream portions of the tributaries more closely resemble the lower concentrations of the current discharges, whereas the higher concentrations in downstream portions of the tributaries reflect the higher-level historical discharges" AQ/NCG RI
  - "The contaminants associated with these newly depositing solids mix with historically deposited contaminants, resulting in a blend of currently and historically deposited contaminants in the surface sediment" AQ/NCG RI
- The text implies that the contamination in the tributaries historically and currently is only from point source discharges since these are the only discharges characterized for the Site to date.
  - NCG sources chapter does not discuss inputs from any upland historical and ongoing sources
- Surface sediment data shows that the concentrations in the tributaries do not resemble COPC concentrations measured in current discharges.
  - Comparison of contaminant concentration in sediments and point source solids show that CSOs and MS4s are not responsible for elevated concentrations in the Creek.
  - Flawed modeling is an attempt to support the incorrect AQ/NCG conclusion that CSOs and MS4s are the cause of surface contamination
  - Other sources exist in the Creek and need to be identified in the RI

Comparison of Naphthalene in Surface Sediment with CSO Solids



Naphthalene concentrations in the most contaminated sections of the Creek are more than 4 times higher than the average naphthalene concentrations in solids from CSOs.

- Naphthalene is not conservative because it volatilizes, evaporates and partitions weakly to sediments.
- The fact that the naphthalene is measured in such elevated levels with regard to CSO solids and background concentrations indicates that there is an undocumented ongoing source of Naphthalene to the Creek (likely NAPL impacts from industrial operations)

Examples of Mischaracterization of Point Sources in the AQ/NCG RI

- AQ/NCG ignores data and upland impacts in making assertions regarding CSOs.
  - "Surface sediment exhibits higher total organic carbon (TOC) levels than normally found in natural systems, due primarily to discharges of solids from CSO and MS4 point sources." "TOC concentrations are high, due in large part to historical and ongoing releases from point sources." AQ/NCG RI
- Sediment samples collected in reference water bodies with CSOs do not support this conclusion.
  - TOC concentrations in the Creek tributaries are about two times higher than CSO reference areas
    - OC levels in the sub-surface sediments are elevated when compared to surface sediments and as high as 40% with the highest OC concentrations occurring in the TB area, adjacent to the former MGP site.
    - There is no data to indicate that the historical OC loads from CSOs were elevated. Range of OC concentrations in the industrial sites is not discussed.
    - Upland data from NCG sites show OC levels in the soils ranging from > 5% to 31%.
  - Native materials in the Turning Basin area report OC greater than 5% as high as 20%.
    - On average TOC in un-impacted native material is <1%.
    - There are other sources of OC to the Creek surface and subsurface sediments.
  - The NCG uses TPH/TOC ratio to discuss the composition of OC in the sediments of the Creek, however this data clearly shows that CSOs and MS4s are not the only sources of OC and there are multiple sources of OC.

Examples of Mischaracterization of Point Sources in the AQ/NCG RI

NYC Environmental Protection

- AQ/NCG RI uses sediment trap data to speculate impact of CSO and MS4 solids on the Creek.
  - "TPAH concentrations from Q2 are consistently higher than in Q1 and Q3, and Q3 results are consistently higher than in Q1 at the majority of locations. These differences over time likely reflect differences in precipitation and/or point sources discharge activity. One other notable observation is in Whale Creek, where the concentration from the Q1 sample (97 mg/kg) is approximately four to five times higher than the concentrations from Q2 (20 mg/kg) and Q3 (24 mg/kg)." AQ/NCG RI
- These conclusions are not supported by data
  - The concentrations measured in the sediment traps during Q2 are as high as 400 mg/kg with average concentration in the tributaries of 126 mg/kg.
  - Average concentrations in CSOs are 36 mg/kg (max ~100 mg/kg) and in MS4 are 56 mg/kg (max~100 mg/kg).
- Sediment Trap split sample data shows that NCG Q2 results for TPAH are biased high. NCG Quarter 2 TPAH data are not reliable and should be excluded.
- The TPCB and Cu concentrations in the traps does not match the concentrations measured in CSO and MS4 solids.
  - PCB concentrations in the traps are elevated, in some cases 60 times, those measured in CSO and MS4 solids.
  - Cu concentrations are an order of magnitude higher than those in CSO and MS4 solids.

Sediment Trap Data Supports The Presence Of Additional Ongoing Sources To The Creek Not Identified In The AQ/NCG RI

Examples of Mischaracterization of Point Sources in the AQ/NCG RI

NYC Environmental Protection

- The AQ/NCG RI indicates that the point source solids are a source of TPAH to the surface sediments of the Creek, but not a source of TPCB or Copper.
  - For TPCB and Cu, some of the traps from CM2+ areas exhibit concentrations that are almost a factor of ten lower than nearby surface sediment. These observations suggest that external sources of solids (i.e., from points sources and East River), containing relatively lower chemical concentrations, represent a greater contribution to sediment traps in CM 2+ than solids from local resuspension. This also suggests that <u>point sources may exert a greater influence on TPAH concentrations in depositing sediment (and therefore surface sediment), as compared with TPCB and Cu</u>. AQ/NCG RI
  - "The observation that the TPAH in the sediment traps appears most sensitive to variation in rainfall supports the concept that the point sources are a <u>more significant source of TPAH to newly depositing sediment, compared with TPCB and Cu</u>. Although TPCB and Cu generally do not show this same sensitivity, the elevated TPCB concentrations observed in the Q2 samples from one location each in Dutch Kills and Maspeth Creek may also be indicative of <u>variations in point source loads at these locations</u>." AQ/NCG RI

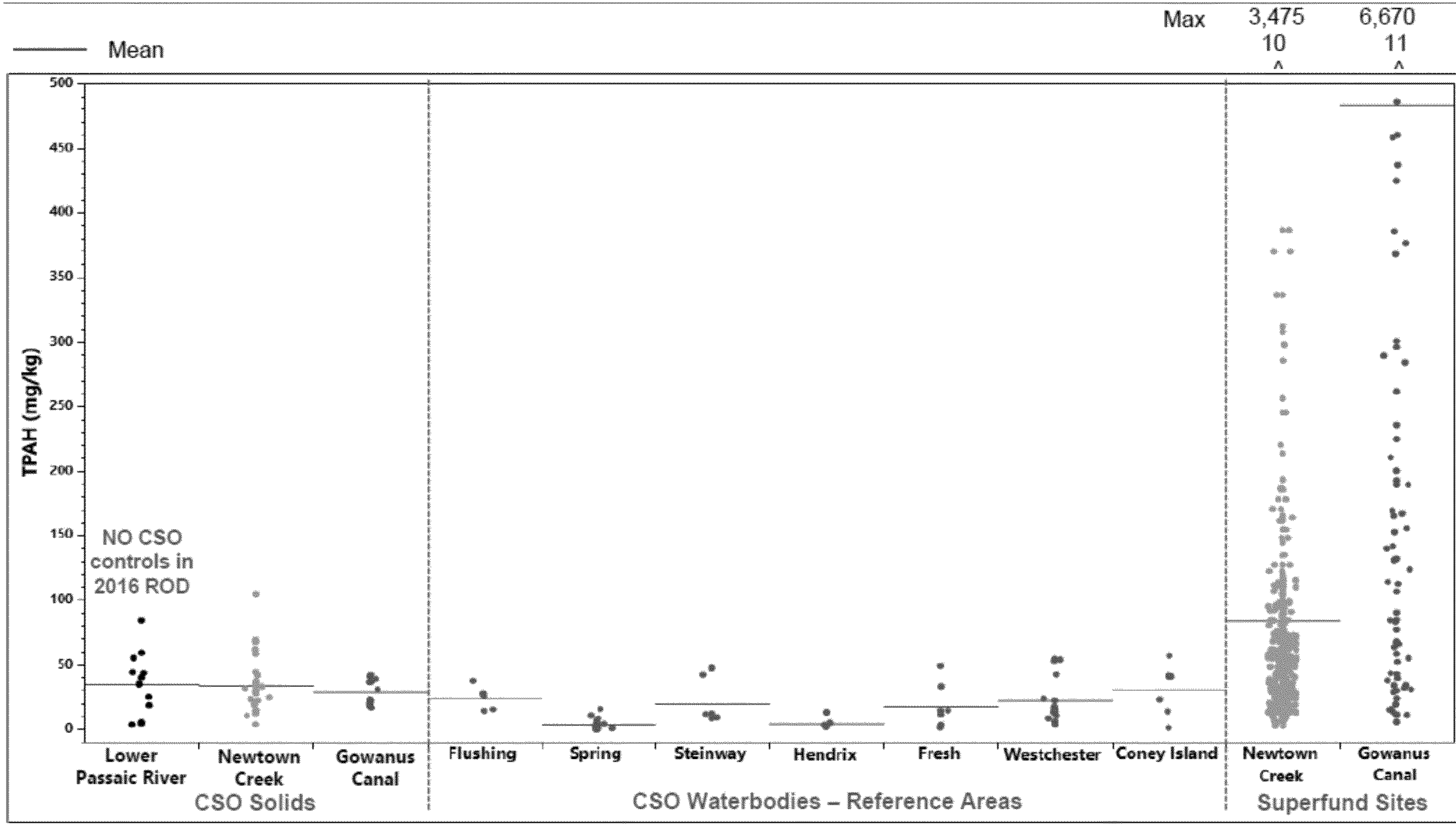
- Preferential delivery of one class of contaminants over other contaminants from a single source is not possible.
  - To account for elevated TPAH concentrations in the traps, compared to other contaminants, another source of TPAHs to the Creek is needed.
  - NAPL migration to the surface sediments of the Creek (ebullition and upland sites) is a major source of TPAHs, which is not accounted by the AQ/NCG RI.
- The AQ/NCG RI fails to mention that the solids in the sediment trap of the Creek will also represent inputs form non-solids associated sources such as NAPL (seeps, ebullition). These inputs will cause enhancement of COPCs in the traps from the solids.

Mischaracterization of Impact of Point Sources

- AQ/NCG RI incorrectly attributes toxicity in the sediments to CSOs and MS4s.
  - "The risks to the ecological communities at many locations in the tributaries are attributed primarily to significant ongoing discharges from CSOs and MS4s. While those ongoing discharges are traditionally regulated by the Clean Water Act (CWA), they include CERCLA hazardous substances and other pollutants and contaminants that contribute to those risks and must be considered in the evaluation of remedial alternatives in those portions of the Study Area." AQ/NCG RI
  - "Ongoing contaminant loads from point sources are a critical consideration in decision-making for the site. To the extent that point sources are not fully controlled, they will continue to influence the future of the system. Deposition of contaminated solids from ongoing sources will limit the effectiveness of remedial actions in reducing risk in certain portions of the Study Area." AQ/NCG RI
- The analysis used by AQ/NCG to make this claim is unsupportable.
  - The AQ/NCG RI attributes toxicity in the sediments to CSOs/MS4s using an uncertain benchmark for C19 to C36 fractions (AQ/NCG BERA).
  - AQ/NCG did not analyze CSO/MS4 solids for this benchmark during the Phase 2 program. Only Phase 2 sediments, a biased dataset, was analyzed for this metric.
  - Request for explanation of derivation of toxicity due to this metric has not been provided by the AQ/NCG.
- Evaluation of the reference area data shows that reference area waterbodies with CSOs are not toxic to benthic community.
- Chemical data from reference areas with CSO/MS4s have background levels of COPCs

Data Collected For The RI/FS Does Not Support Consideration of CSO/MS4 Controls Under CERCLA

TPAH levels in CSOs are comparable to surface in Reference Areas



TPAH levels in CSO waterbodies are similar to CSO solid concentrations. These waterbodies have similar sewersheds, histories and CSO levels. CSO contributions are not the cause of elevated Superfund concentrations

Impact of Point Sources

- The biased attribution of COPCs to CSOs and MS4s needs to be deleted from the text.

- Reference Area data should be used as a line of evidence to assess impact of CSO and MS4s on a given waterbody.

- The RI/FS needs to be revised to identify data gaps in understanding of sources to the Creek.

- Additional data is needed to explain the elevated COPC levels
  - COPC data from upland sites
  - Proposed sampling – ebullition, NAPL delineation
  - Sampling is needed to measure COPCs in NAPL seeps from upland sites.
  - A thorough and quantitative upland site assessment is needed to identify sites that potentially are impacting the sediments of the Creek

Contaminant Fate and Transport Assumptions in the AQ/NCG RI are Fundamentally Flawed

Flawed Assumptions for Contaminant Fate and Transport

NYC Environmental Protection

- The AQ/NCG RI conflates solids transport with COPC transport
  - While the sources of solids to the Creek are primarily from East River, Stormwater and CSOs, **the contaminant sources are not**.
- The AQ/NCG RI ignores the presence of NAPL as a significant source of COPCs to the Creek.
  - Surveys conducted by NYCDEP and NCG show that NAPL migration from subsurface sediments is a source of COPCs to the surface sediments.
  - NYCDEP has also shown evidence of NAPL seeps from upland sites.
- The RI also arbitrarily states that GW is insignificant when it is one of the largest measured source of COPCs to the Creek

Contaminant Fate And Transport Modeling Will Fail To Explain COPC Concentrations Due To Flawed Assumptions

Without Consideration Of NAPL As A Source The Contaminant Fate And Transport For The Site Will Be Inadequate

Contaminant Fate and Transport in the Creek

- The AQ/NCG RI explanation of elevated concentrations in the Creek is fundamentally flawed
  - "Larger particles settle closer to the release point, and finer particles and particles with higher organic matter content are generally transported farther. In general, contaminants sorb more strongly to finer particles (and often to particles with more organic matter), compared with coarser and inorganic particles. This process contributes to the observed distribution of contaminants in surface sediment of the tributaries—in general, **contaminant concentrations increase with distance downstream from the head of the tributaries. In part, this is likely due to fine particles (generally with higher contaminant concentrations) being transported farther downstream than coarse, less contaminated particles**." AQ/NCG RI
- Variations in fine grained content and COPC associations with fine sediments and OC are insufficient to cause the gradient they have measured.
  - For example elevated TPAH and TPCB sediment concentrations in East Branch cannot be explained by OC or fines.
- This statement also fails to include other sources of contaminants to the sediments of the Creek such as NAPL migration (ebullition from subsurface sediments, upland sites) and groundwater

NAPL is not Considered in Contaminant Fate and Transport

- AQ/NCG RI uses misleading terms such as “residual NAPL”, “no NAPL” and “localized areas” in an attempt to downplay impacts of NAPL.
  - “The majority of NAPL is principally in the form of residual NAPL (i.e., sediment samples that produced blebs when subject to a field shake test). Residual NAPL, the condition where the NAPL saturation is sufficiently low, therefore <u>NAPL is immobile</u>.” AQ/NCG RI
  - However, there is no data to support that “residual NAPL” is non-mobile or is not an ongoing source of COPCs to the Creek
- AQ/NCG RI states that cores with visual observations and shake test results of sheens are not considered indicators of NAPL, which is contrary to available data (ebullition survey and LIF).
  - NCG Ebullition Survey conducted in 2016 documents NAPL migration in Whale Creek, Dutch Kills and in East Branch (non-CSO fork).
  - These areas are identified by NCG as areas where either NAPL is not present (observations of sheens) or NAPL is residual (presence of blebs)
- LIF data, a standard technique for delineating NAPL (including upland sites adjacent to the Creek) shows that NAPL is prevalent in surface and subsurface sediments throughout the Creek.
  - This NAPL can be mobilized through groundwater, ebullition, capillary action

Contaminant Fate and transport

- The RI/FS should include NAPL as a source of COPCs to the sediments of the Creek.
  - COPC concentrations in the sediments of the Creek cannot be explained by current contaminant fate and transport.
- AQ/NCG RI current delineation of NAPL is insufficient and minimizes NAPL impacted sediments in the Creek.
- NAPL migration has been documented in the Creek, including sediments with "blebs" and "sheens" (considered non-mobile NAPL by AQ/NCG)
- Nature and extent of COPCs in the NAPL is a data gap.

Without Consideration Of NAPL As A Source The Contaminant Fate And Transport For The Site Will Be Inadequate

AQ/NCG RI Groundwater Assessment is Flawed

AQ/NCG RI Groundwater Assessment is Flawed

NYC Environmental Protection

- Comments given by the EPA and NYCDEP during Groundwater modeling workshops were not addressed by the NCG leading to a development of flawed and unsupported groundwater CSM
- AQ/NCG RI groundwater conceptual site model (CSM) is flawed for several reasons. The CSM:
  - Ignores groundwater discharging through the creek banks.
  - Underestimates groundwater recharge.
  - Overestimates groundwater losses to sewers and subway tunnels.
  - Underestimates groundwater discharge.
- Flawed data collection resulted in underestimating groundwater discharge
- Groundwater COPC loading estimates based on the flawed CSM and data underestimate loading of COPCs by groundwater.

Groundwater Is The Largest Measured Source Of COPCs To The Creek (1BGY, 2.5 Tons PAHs/Yr)

AQ/NCG RI Significantly Underestimates Impacts Of Groundwater

NCG's Groundwater CSM is Flawed – Water Balance

- AQ/NCG RI overestimates "impervious area" and use a highly uncertain regression, underestimating groundwater recharge by ~3 times the USGS value.
- AQ/NCG RI overestimates groundwater losses by
  - Misinterpreting "extraneous flow" values from a 1982 report, resulting in an <u>overestimation of groundwater losses to sewers by 1.3 billion gallons/year (BGY)</u>
  - Misinterpreting USGS simulated subway dewatering, resulting in an <u>overestimation of subway dewatering by 0.4 BGY</u>.
- Based on all of these errors, AQ/NCG RI concludes there is a net loss of 0.75 MGD from the aquifer not supported by any data or available USGS models for the area.
  - If NCG's conclusion that the aquifer loses 0.75 MGD were true, groundwater levels in Brooklyn and Queens must drop as aquifer storage is removed (storage must be removed before infiltration of surface water occurs).
  - There is no evidence of any such aquifer declines: after recovering from over pumping since the 1950s the USGS long-term water level monitoring documents groundwater levels are stable and respond to precipitation since the 1990s, <u>directly refuting NCG's CSM</u>.

Groundwater Discharge To The Creek Is Underestimated in the AQ/NCG RI By About 2 Billion Gallons/Year

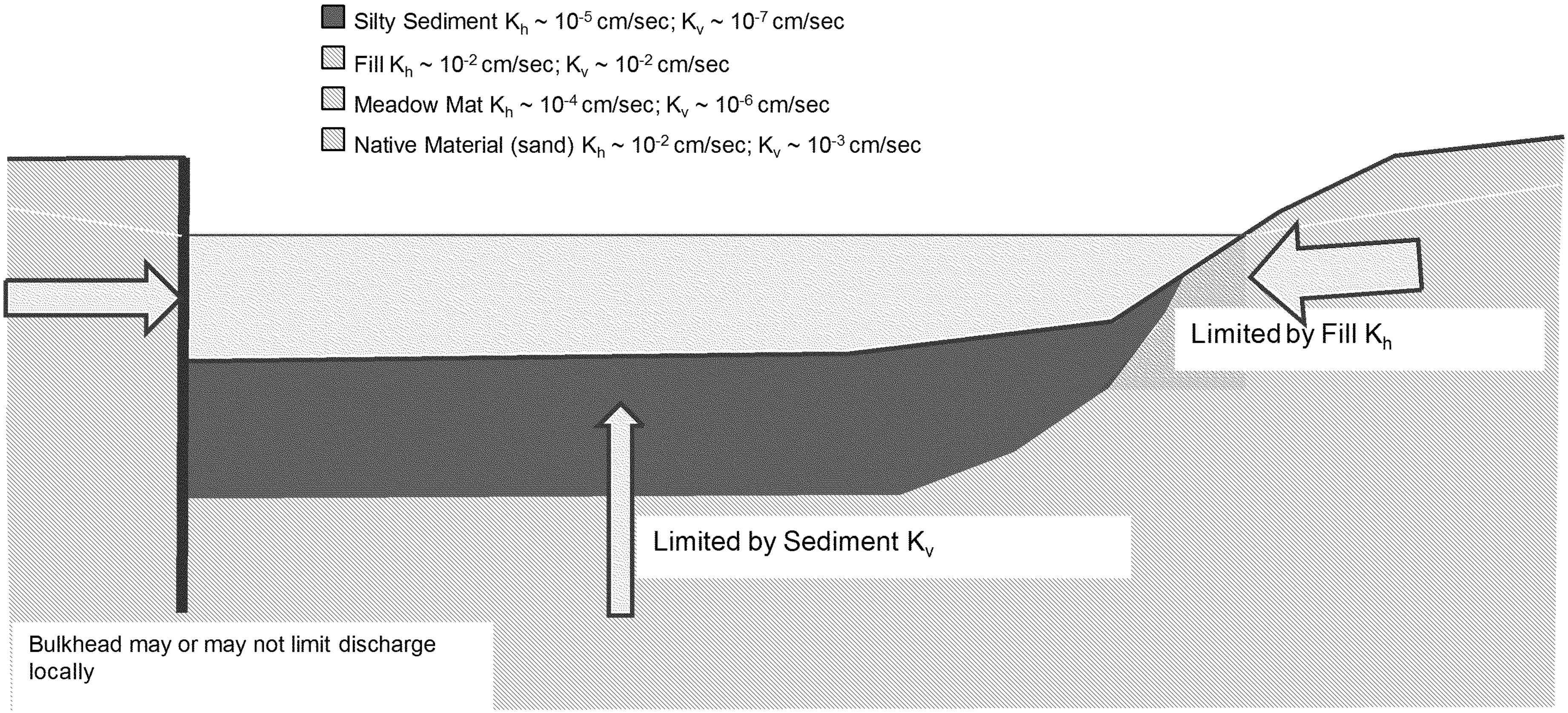
- The City's review of slug testing found that many of these tests were conducted using faulty equipment. AQ/NCG RI has never acknowledged errors in the slug testing.
- Additional errors with this testing was identified while reviewing the RI
  - NCG's flawed slug tests in mid-depth soft sediment resulted in an average hydraulic conductivity of 1.75 x 10^{-3} cm/second (equivalent to medium to fine sand). 10 out of 17 mid-depth sediment wells went dry and another 5 had more than 10 feet of drawdown when purged for low flow sampling at a rate of 50 ml/min. Drawdown of this magnitude at this low pumping rate is equivalent to a hydraulic conductivity as low as 10^{-7} cm/sec, equivalent to fine grained material.
  - When testing soft sediment, NCG used water displacements averaging 1.6 feet. According to Dr. Butler of the Kansas Geologic Survey, considered the authority on slug testing, such displacement in soft sediment would cause overestimation of hydraulic conductivity. He advised displacements for tests in soft sediment should be a few inches at most.
  - Issues with NCG's Hydraulic Profiling Tool (HPT) calibration confirmed the issue of sediment deformation.
  - Sediment core logs also show that the sediments in the Creek are fine grained.

Ignoring These Lines Of Evidence Results In The Erroneous Conclusion That Fine Grained Material Has The Hydraulic Conductivity Of Medium Sands

Horizontal Groundwater Discharge to the Creek is Ignored

NYC Environmental Protection

Based on erroneous slug tests and their seepage metering, NCG claims discharge through the Creek banks is unimportant. However, most of the groundwater discharges through the banks and is not characterized in the RI.



Fill K_h can be more than 10,000 greater than Sediment K_v so a smaller area can discharge considerably more water. The City's evaluations estimate the banks discharge about 5 times more water than the sediment bed. NCG's groundwater contour map for the fill shows discharge almost everywhere mapped.

NCG Groundwater COPC Loadings to the Creek are Flawed

NYC Environmental Protection

- AQ/NCG estimates 1700 kg/yr of TPAH arrive at the sediment bed but only 22 kg/year of TPAH make it through to the surface water.
- This calculation of loading is inaccurate because:
  - NCG used in-situ sampling to measure COPCs in the shallow sediment, including SPMES for organics and peepers for metals and DOC deployed for risk assessment purposes.
  - Also, SPMES do not measure DOC associated COPCs so underestimate transported COPCs in the groundwater and pore water.
  - Because the shallow sediment is exposed to tidal pumping, these samples are composites of surface water and groundwater diluting COPCs in groundwater.
  - All these limitations result in underestimating COPC concentrations associated with GW
- NCG then compounds this by using **only** groundwater discharge from sediments (seepage metering) to calculate groundwater loads.
  - Loads from horizontal discharge originating at upland sites are ignored.
  - Horizontal discharge through the banks is documented to be associated with NAPL – significant source of COPCs.

AQ/NCG RI Uses Inappropriate Data To Develop An Inaccurate COPC Loading

COPC Loads From Horizontal Discharge (Upland Sites) Are Ignored And Present A Data Gap That Should Be Addressed In The RI/FS

Groundwater Sections of the RI - Conclusions

NYC Environmental Protection

- The groundwater CSM and loading calculations in AQ/NCG's Draft RI:
  - Underestimate groundwater discharge to Newtown Creek by underestimating recharge and over estimating losses.
  - Ignore groundwater discharging from upland sites through the banks of the Creek
  - Underestimate COPC concentrations in discharging groundwater
  - Ignore/fail to characterize potentially significant COPCs that arrive through the banks of upland sites

Photos at RM-1.6 taken by AQ/NCG field crew showing groundwater discharge from the bank.

AQ/NCG RI Underestimates Groundwater COPC Loads And Mischaracterizes The Fate of COPCs Once They Arrive at Surface Sediments

Sediment Fate and Transport

Selected Sediment Transport Issues

- Solids loading is inadequately characterized
- East River grain-size distribution derived through "model calibration" rather than measured.
- Settling speeds for solids of the same class is different. East River cohesive solids are assigned 3x faster settling speed point source cohesive solids. No justification provided for this assignment
- Size classes/grain-size matter for transport
- TOC is used as a tracer for CSO and MS4 solids
  - AQ/NCG model-predicted bed f_{oc} is comparable to measured foc in CSOs and MS4s.
  - To use this as an evidence in validating the sediment-transport model, AQ/NCG RI states that OC from CSO is inert (G3)
  - This assertion ignores
    - The AQ/NCG's own BOD_5 measurements, with values reaching as high as 100 mg/L and a median ~50 mg/L.
    - Other known sources of organic carbon in Newtown Creek tributary sediments—including NAPL and soot carbon—that are omitted if G3 point-source carbon accounts for the total fraction of organic carbon in the sediment.

AQ/NCG's sediment transport model calibration has not been peer reviewed and is deficient, especially in terms of solids loading characterization, justification for differential settling rates, and assertion that CSO solids are inert

Conclusion

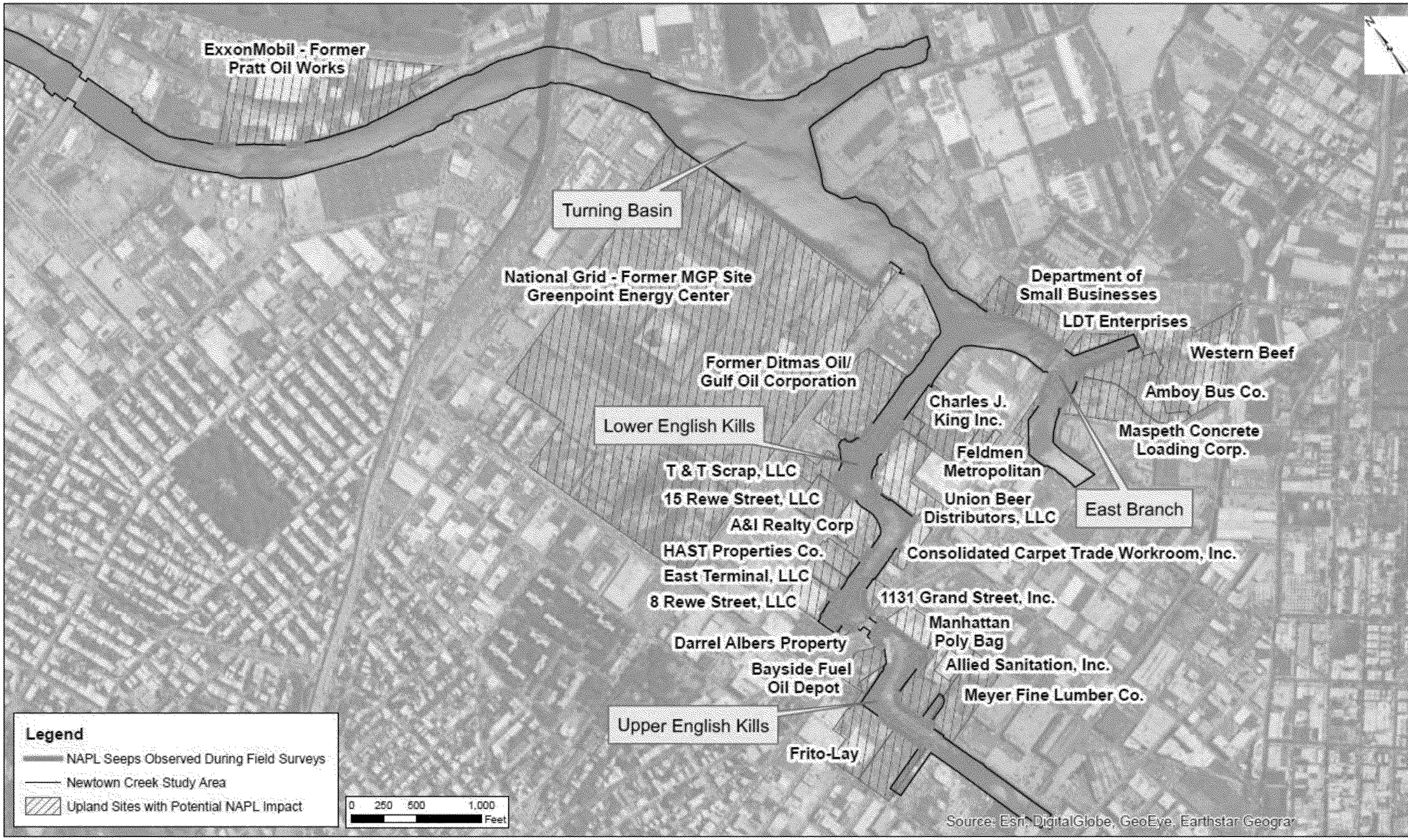
- The AQ/NCG Draft RI is not technically defensible – it is incomplete and inaccurate
  - Significant rewrite of the sections of the Draft RI is needed
  - Current review process and schedule for finalizing Draft RI must reflect the need for these revisions
- There are several gaps in the AQ/NCG Draft RI.
  - Upland sites remain uncharacterized – schedule and process for incorporation in the RI/FS process should be developed
  - COPC loads due to NAPL (seeps from upland sites and ebullition) are not quantified.
- AQ/NCG Draft RI Report is biased to overly focus on CSOs and MS4s.
- The Conceptual Site Model (specifically inclusion of groundwater and NAPL impacts) needs to be revised and updated
- A peer review is needed before it can be approved.

AQ/NCG Draft RI Report Has Major Gaps That Must Be Filled Before Approval

Combined RI/FS Approval with Peer Review is the Preferred Process

Questions

Upland Sites with NAPL Seeps



Category 1A Areas (“No NAPL”)

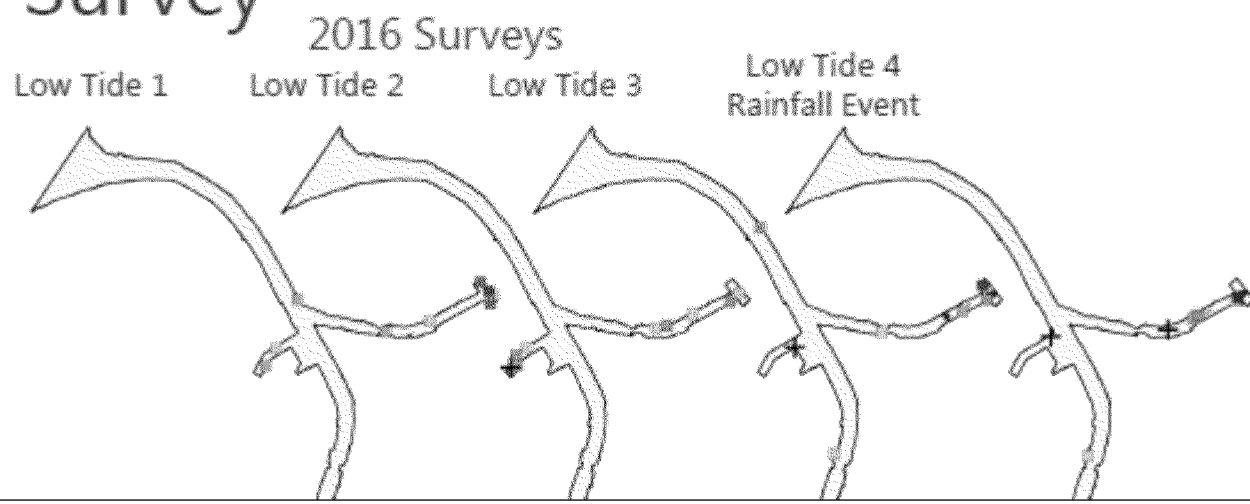
NYC Environmental Protection

- NCG RI states that:
  - *“NAPL was not observed in Dutch Kills or Whale Creek where the most notable visual observations and shake test results were identified as sheen. There were also cores with no visual evidence of potential NAPL and negative shake tests.”*
  - *“Category 1A cores contain no NAPL.”*
- NYCDEP comments:
  - According to NCG, sheen observations in cores/shake tests are considered No NAPL.
  - NCG observed ebullition facilitated NAPL migration in both tributaries in their 2016 ebullition surveys (see below). If sheens are considered no NAPL, then how do they explain ebullition facilitated NAPL migration in these waterbodies?
  - It is inappropriate to treat sheens in cores/shake tests as insignificant as per NCG flow chart. In fact, USEPA and NYSDEC have previously commented that presence of sheens can indicate a source of mobile contaminants.

Screenshot from Dec 8, 2016 presentation

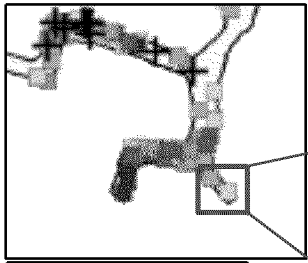
Sheen Blossom and Dynamic Sheen Observations by Survey

- During Low Tide 4 (rainfall event)
  - Higher rates of sheen blossoms were observed
  - More dynamic sheens were observed



Category 1B Area G (East Branch)

NYC Environmental Protection



Screenshot from Dec 8, 2016 presentation showing ebullition facilitated NAPL migration observed by NCG in the Northern Fork of East Branch

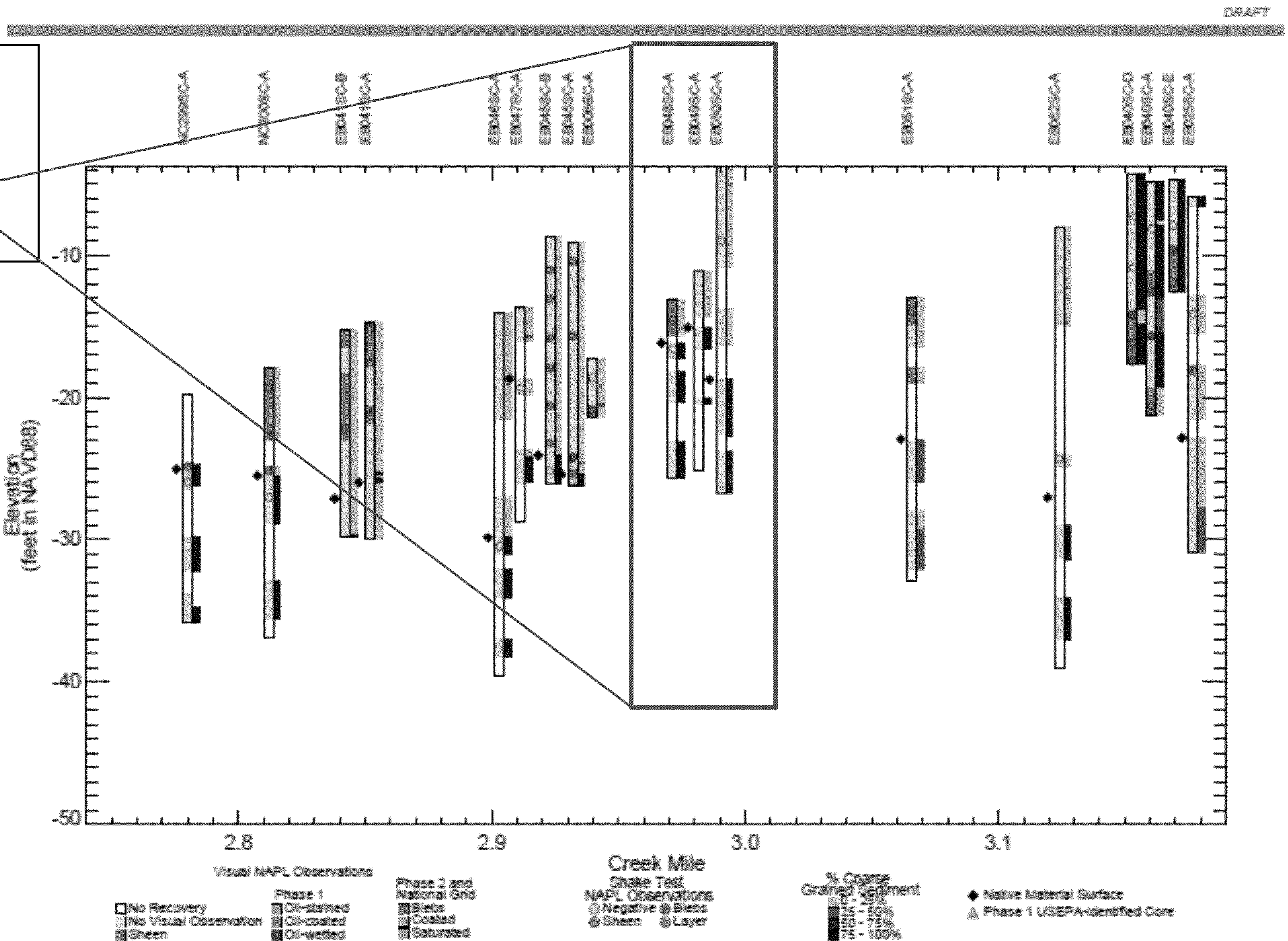
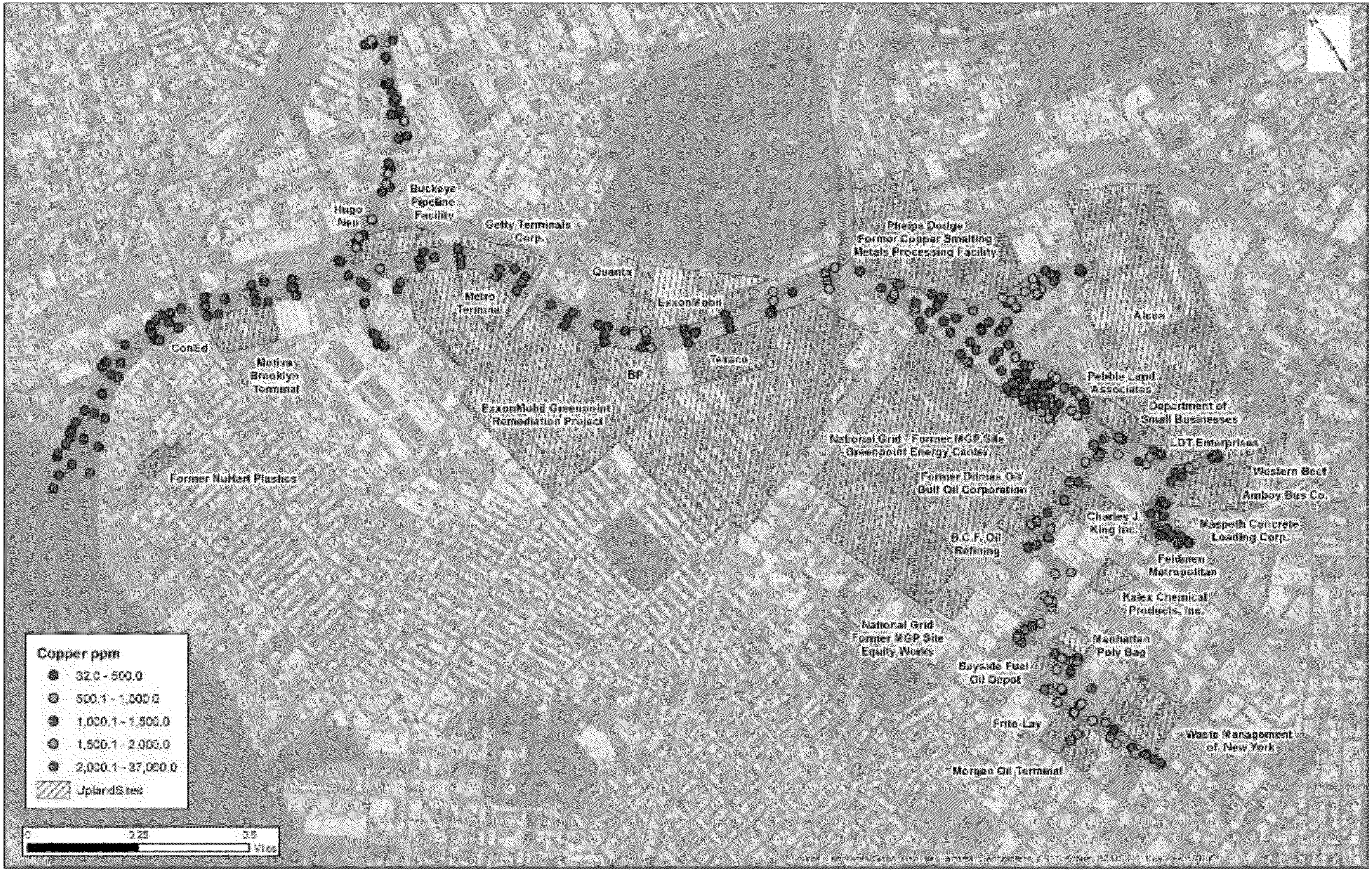


Figure C4-10h
Category 1B Area G Depth Profile
NAPL Evaluation
Newtown Creek RI/FS

Notes: Shake test results include Phase 1 shake-tested cores.
Core IDs of Phase 1 archive cores are identified at the top of each panel with a gray box around the core ID.

ANCHOR QEA

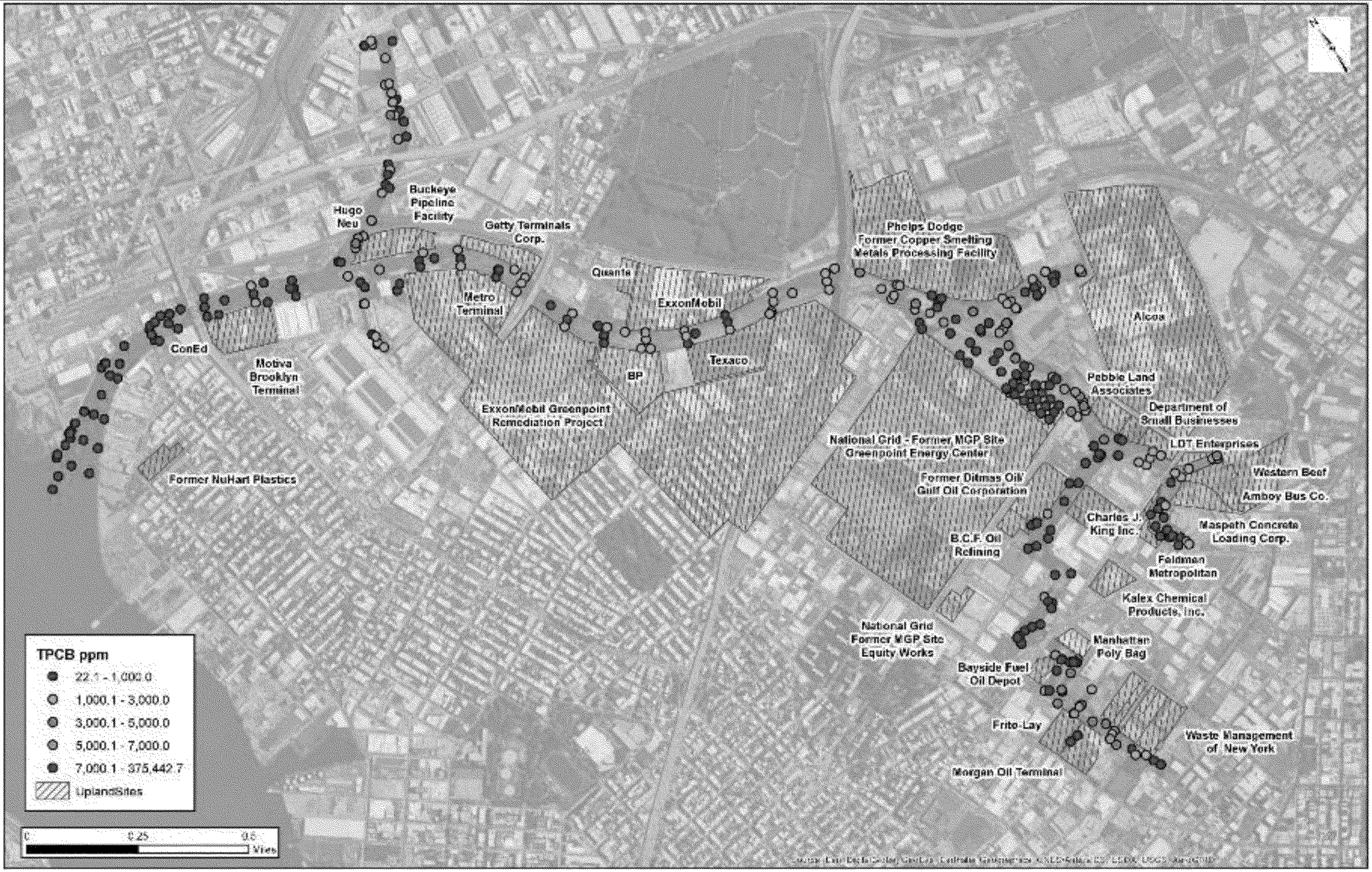
Copper Concentration in Surface Sediments of the Creek



Copper Concentration in the Surface Sediments are elevated in the Turning Basin Area Coincident with the location of the former Copper Smelter Plant

TPCB Concentration in Surface Sediments of the Creek

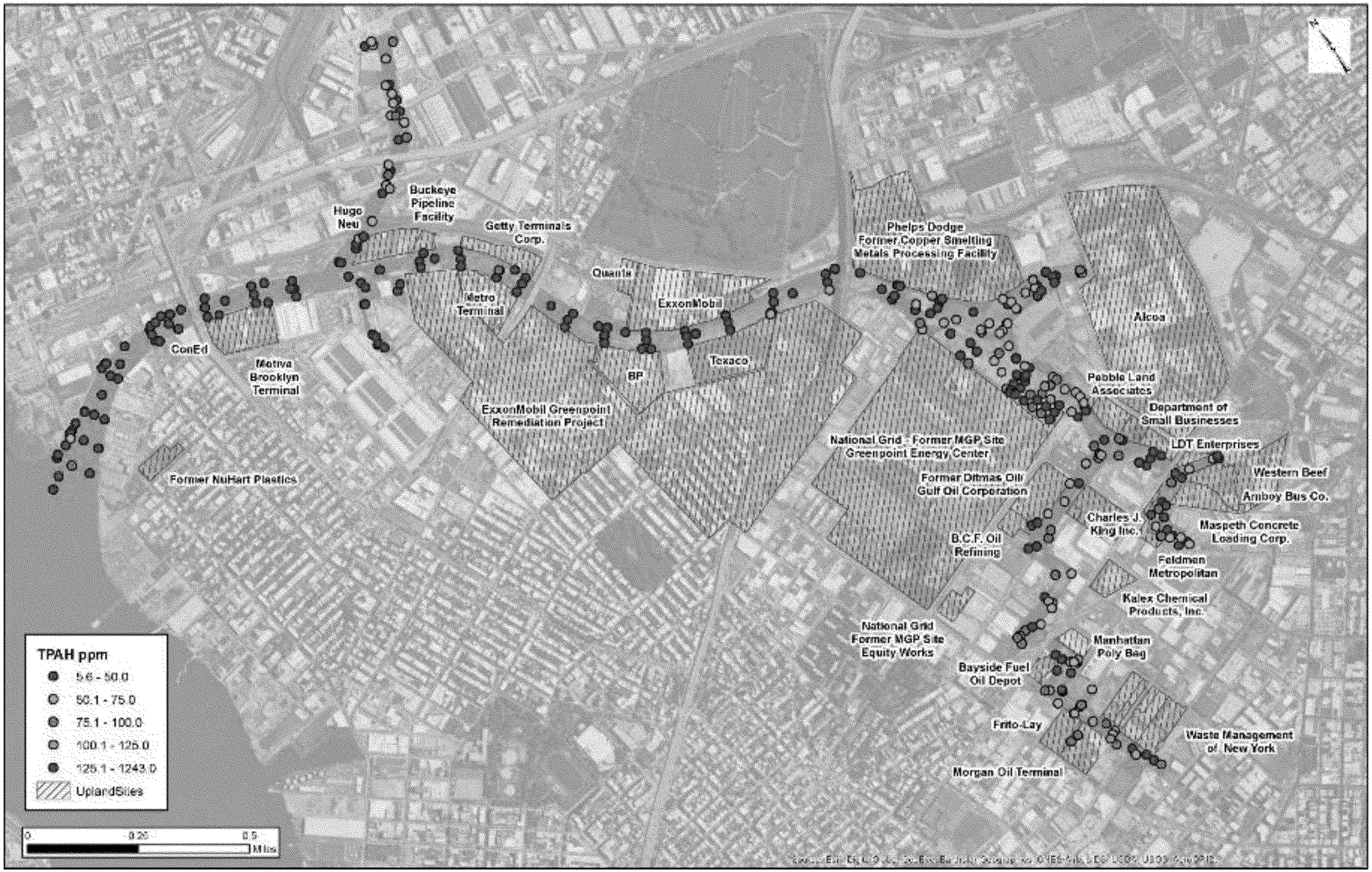
NYC Environmental Protection



TPCB Concentration in the Surface Sediments are elevated in the Turning Basin Area and in English Kills Coincident with location of the former MGP Site and Upland Areas with TPCB Impacts

TPAH Concentration in Surface Sediments of the Creek

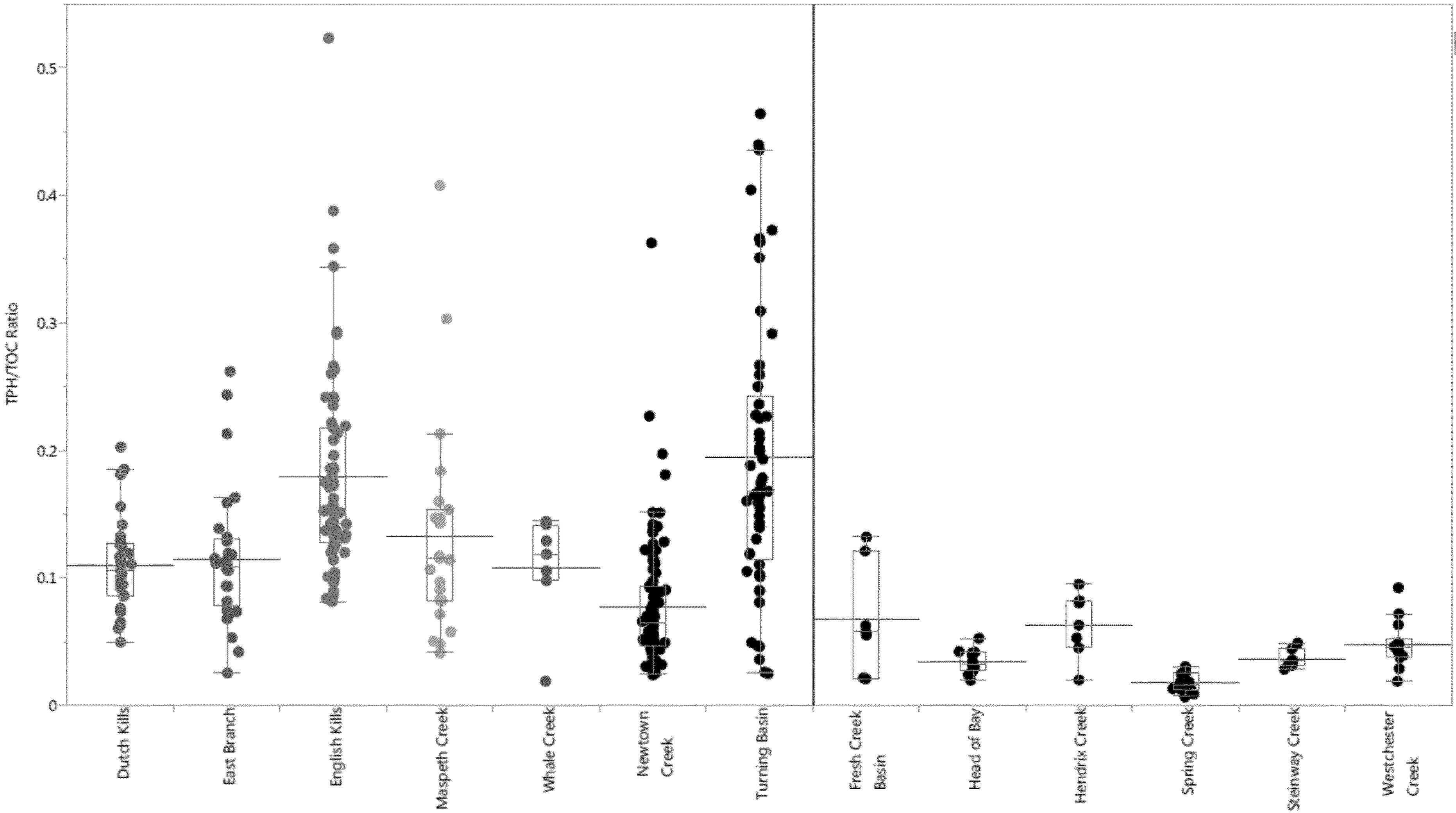
NYC Environmental Protection



TPAH Concentration in the Surface Sediments are elevated in the Turning Basin Area and in English Kills Coincident with location of the former MGP Site Impacts

TPH/TOC Reference Areas with CSOs. vs. Newtown Creek CSO Tribs

NYC Environmental Protection

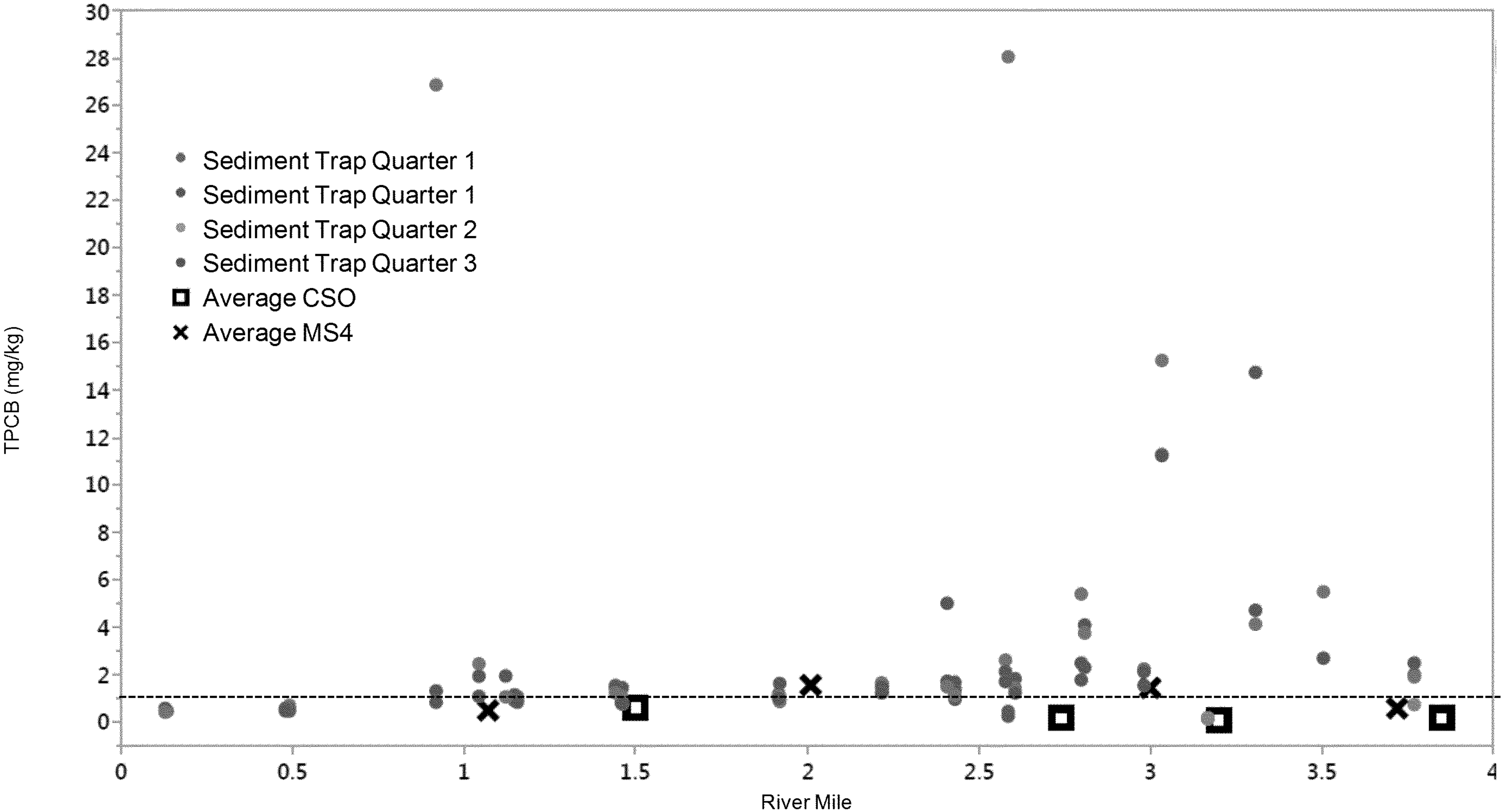


OC "signature" in the Creek is different from OC in the CSO Reference Areas English Kills and Turning Basin (adjacent to former MGP) sediments have a similar ratios, suggestive of a common source

Note: TPH data is not available from NYSDEC National Grid data for Turning Basin – the most contaminated samples/area

TPCB Concentrations in Sediment Trap Solids and CSO Solids

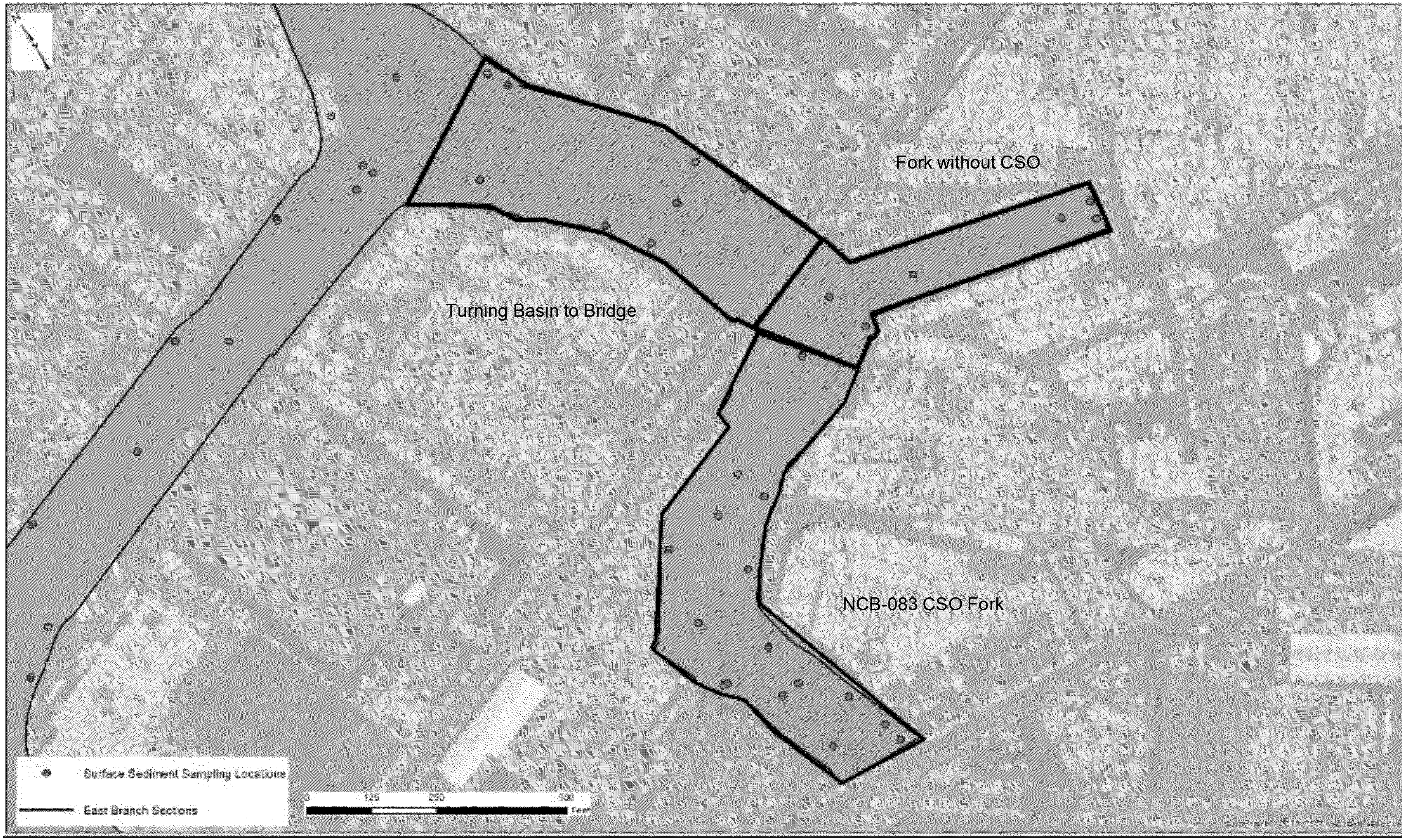
NYC Environmental Protection



- TPCB concentrations in the tributary sediment traps are elevated compared to TPCN concentrations in CSOs and MS4s.
  - Average TPCB in Tributary Sediment Traps is: **Event 1: 2.5 mg/g, Event 2: 7.5 mg/kg and Event 3: 3.8 mg/kg**
  - Average TPCB in **CSOs: 0.28 mg/kg and MS4s: 0.95 mg/kg**

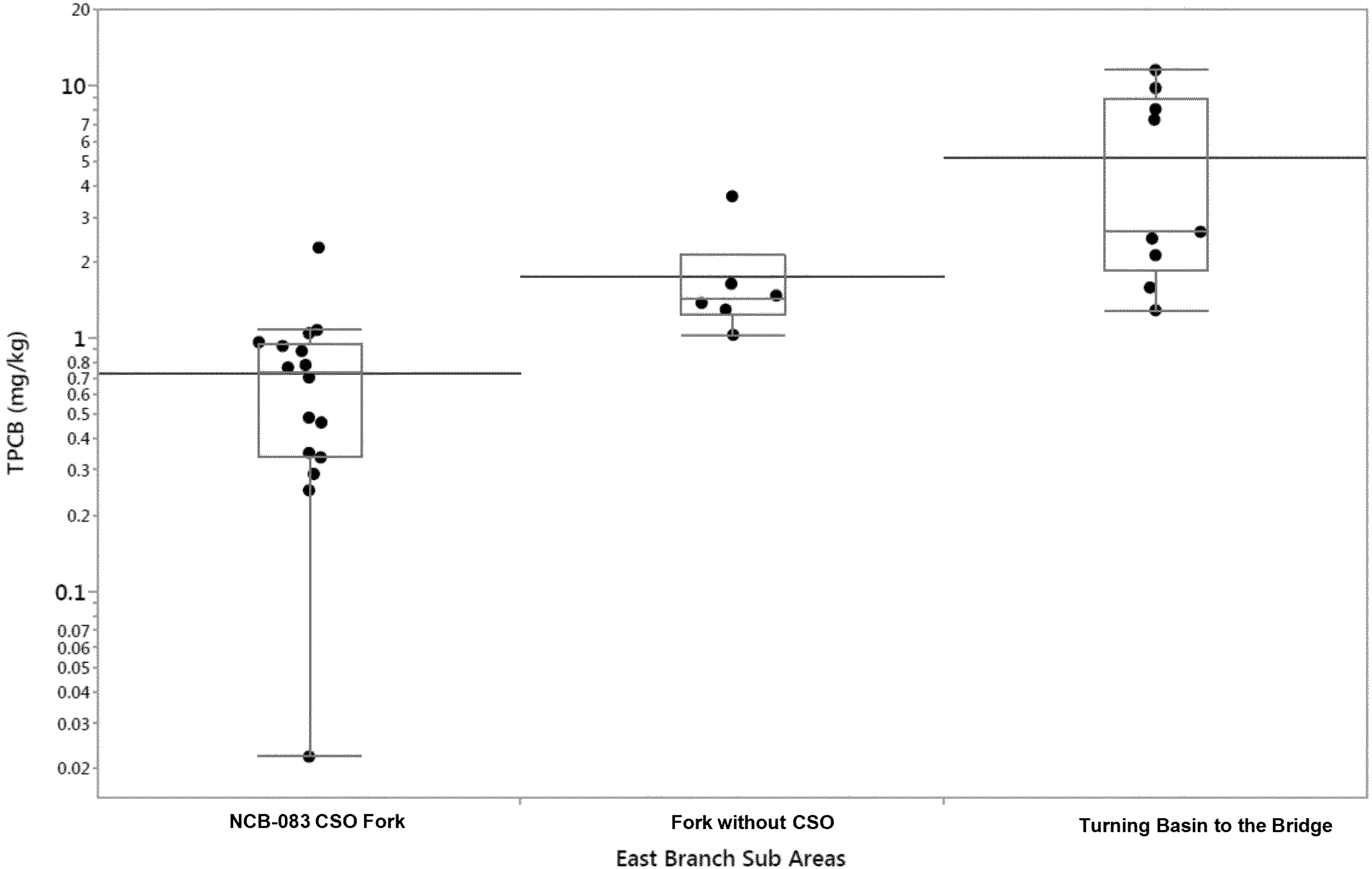
- If the solids in the sediment traps were from CSOs and MS4s, they would show comparable levels of TPCB concentrations.
- Elevated concentrations in the traps indicate a different source of TPCBs to the solids in the water column as they settle in the traps.

East Branch Sections



- For the presentation, East Branch is divided into three sections:
  - Fork with CSO
  - Fork without CSO
  - Connection of Main Stem to Turning Basin

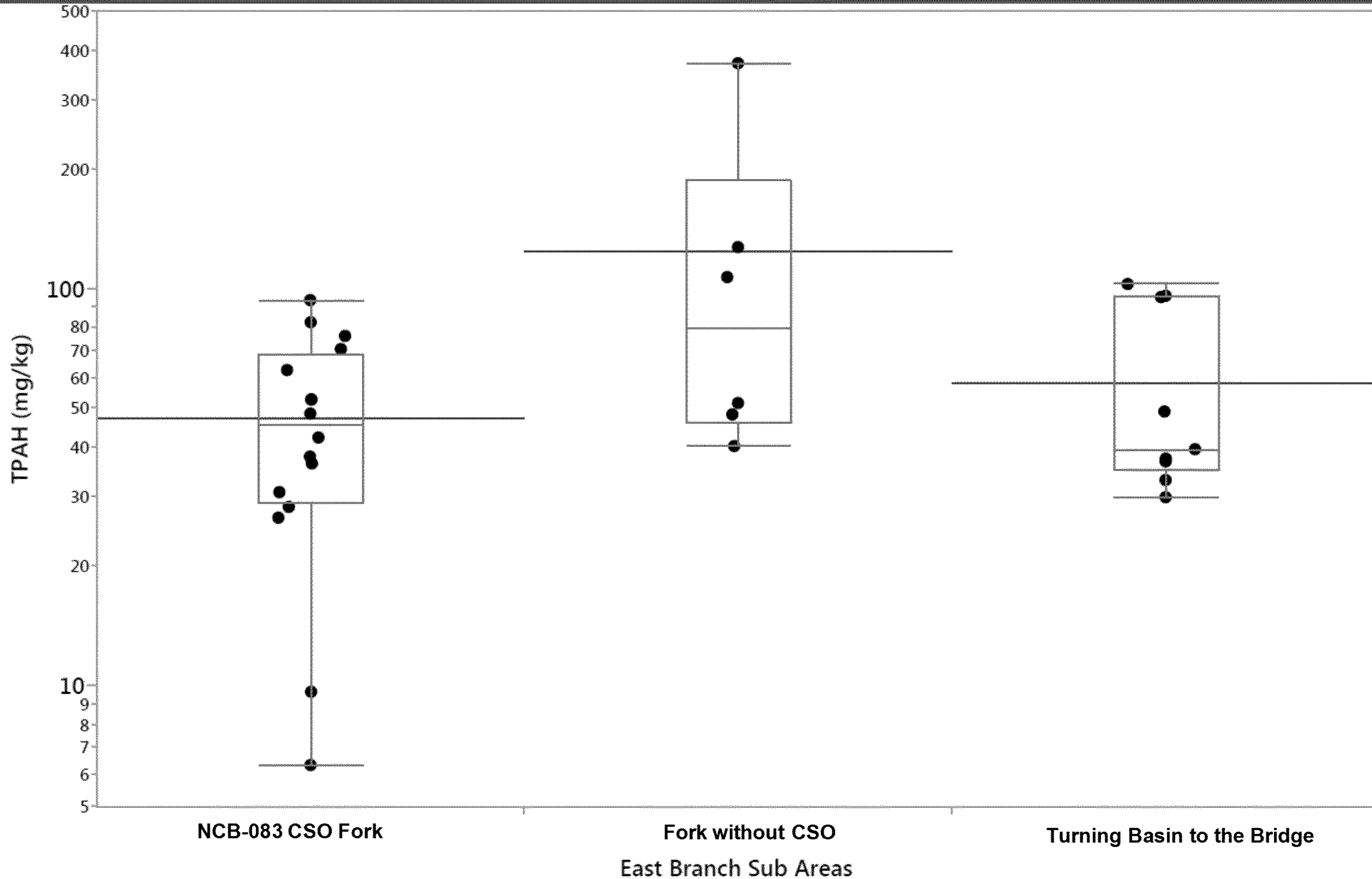
TPCB Distribution in Surface Sediments of East Branch



- TPCB concentrations in the non-CSO fork of East Branch are an order of magnitude higher than those in the fork with a CSO despite comparable grain size and lower OC.
- Also the TB to bridge section of EB is has the highest TPCB concentrations in East Branch despite lower OC content.
- This indicates that the COPC concentrations are not correlated to grains size or OC.

TPAH Distribution in Surface Sediments of East Branch

NYC Environmental Protection

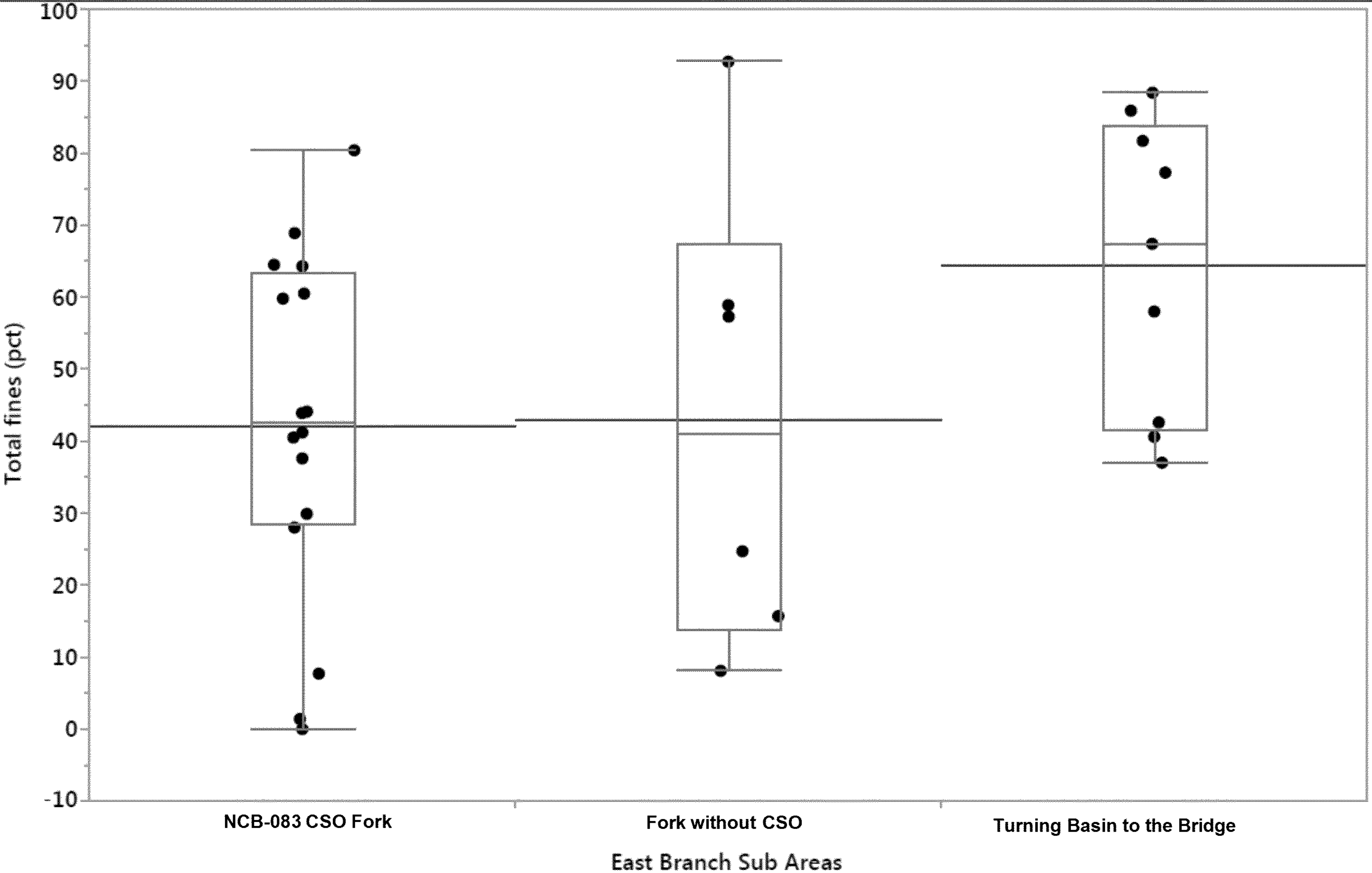


- Average TPAH concentrations in the **Non-CSO fork** are **two times higher** than the TPAH concentrations in the CSO fork of the Creek despite comparable grain size distributions and lower OC content.

- Also the TB to bridge section of EB is has lower TPAH concentration than the Non-CSO fork despite presence of higher total fines concentrations.

- This indicates that the COPC concentrations are not correlated to grains size or OC.

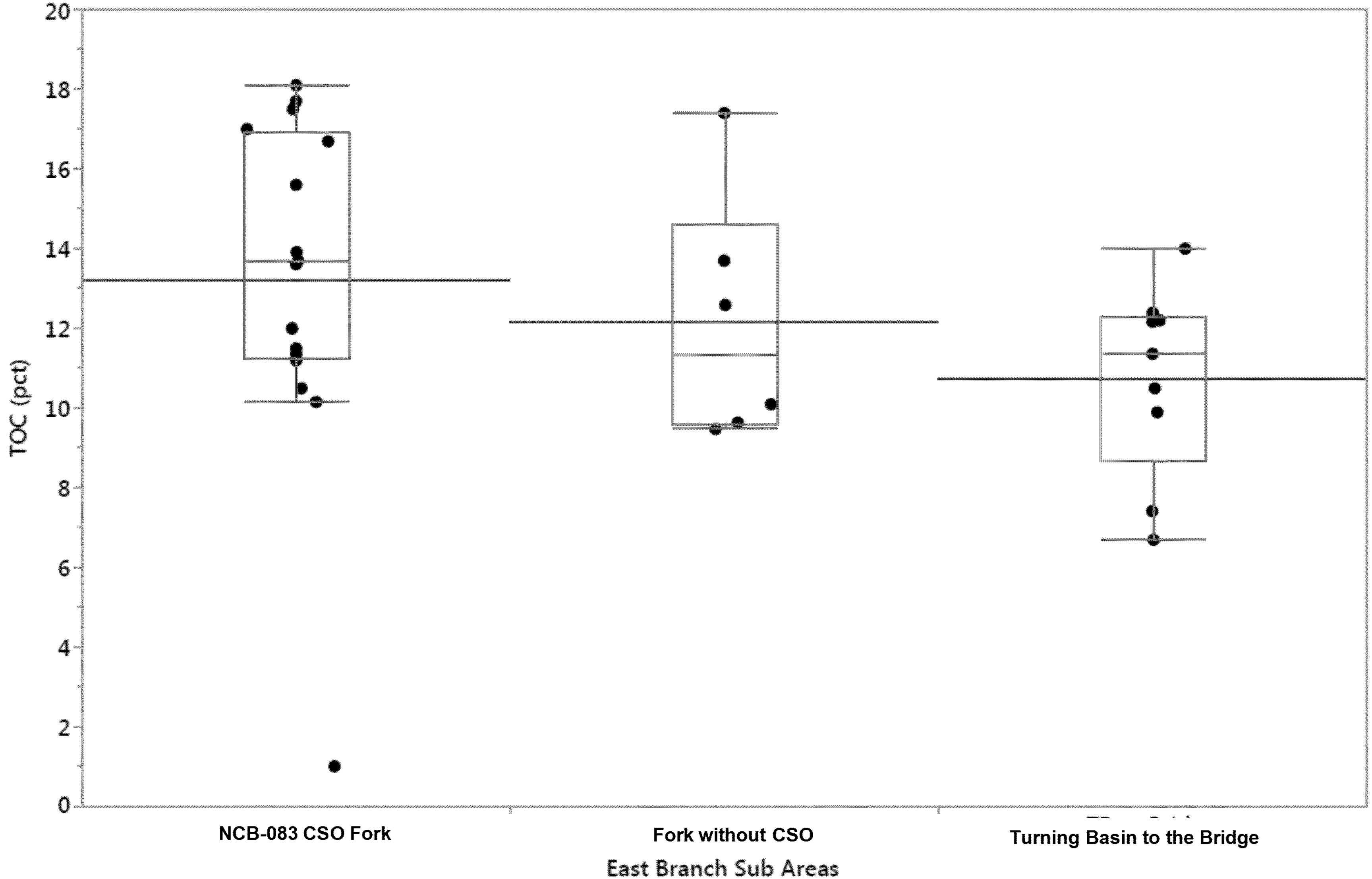
Grain Size Distribution in Surface Sediments of East Branch



- The total fines distribution in the two forks is comparable. Median concentration of fines in the two East Branch forks is ~42%
- The section connecting main stem to the bridge has higher median concentration of fines, about 62%.

TOC Distribution in Surface Sediments of East Branch

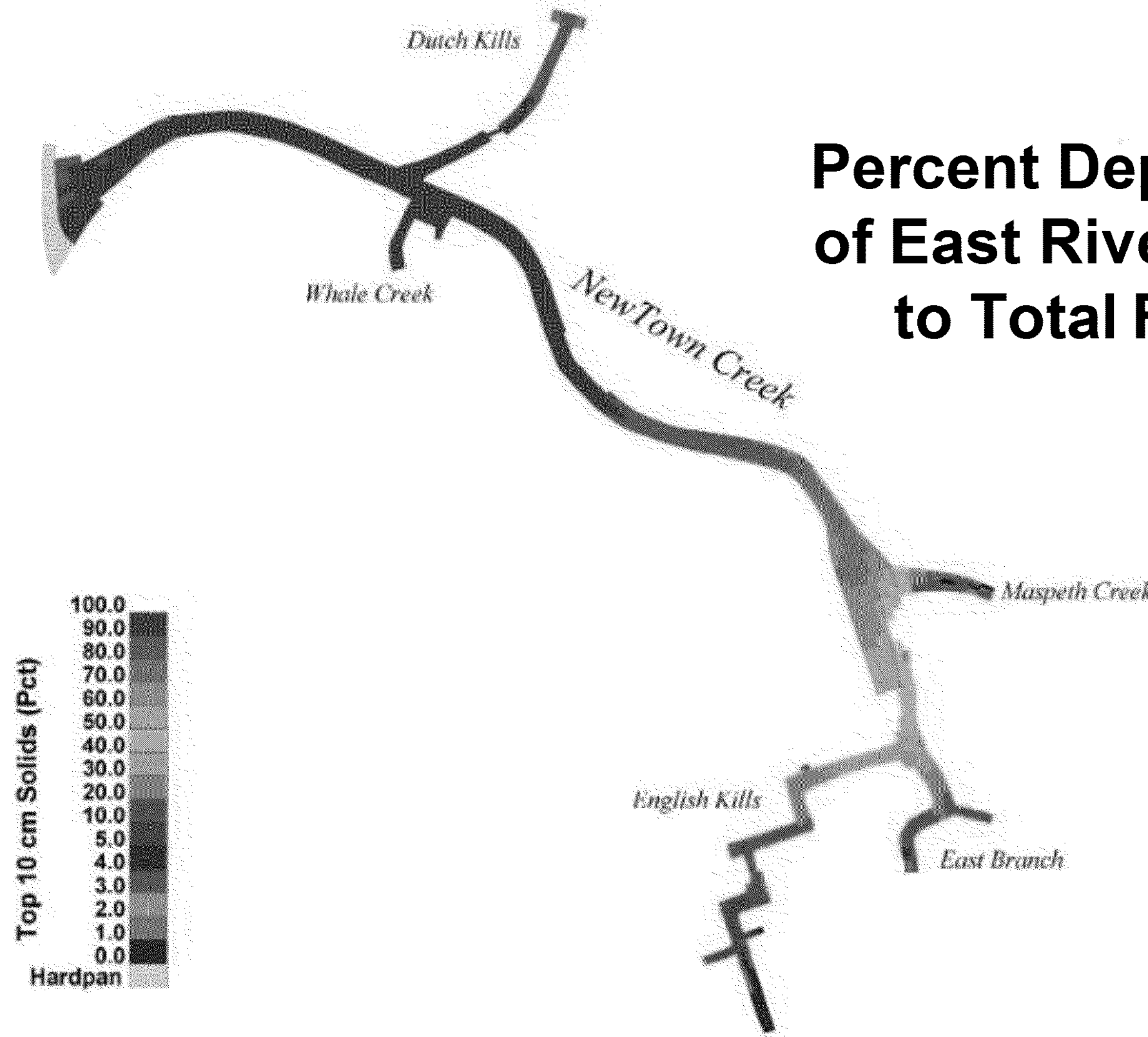
NYC Environmental Protection



- The TOC concentration in the CSO fork of East Branch is higher than the TOC concentration in the other two sections of East Branch

Deposition of East-River Fines in Turning Basin

NYC Environmental Protection

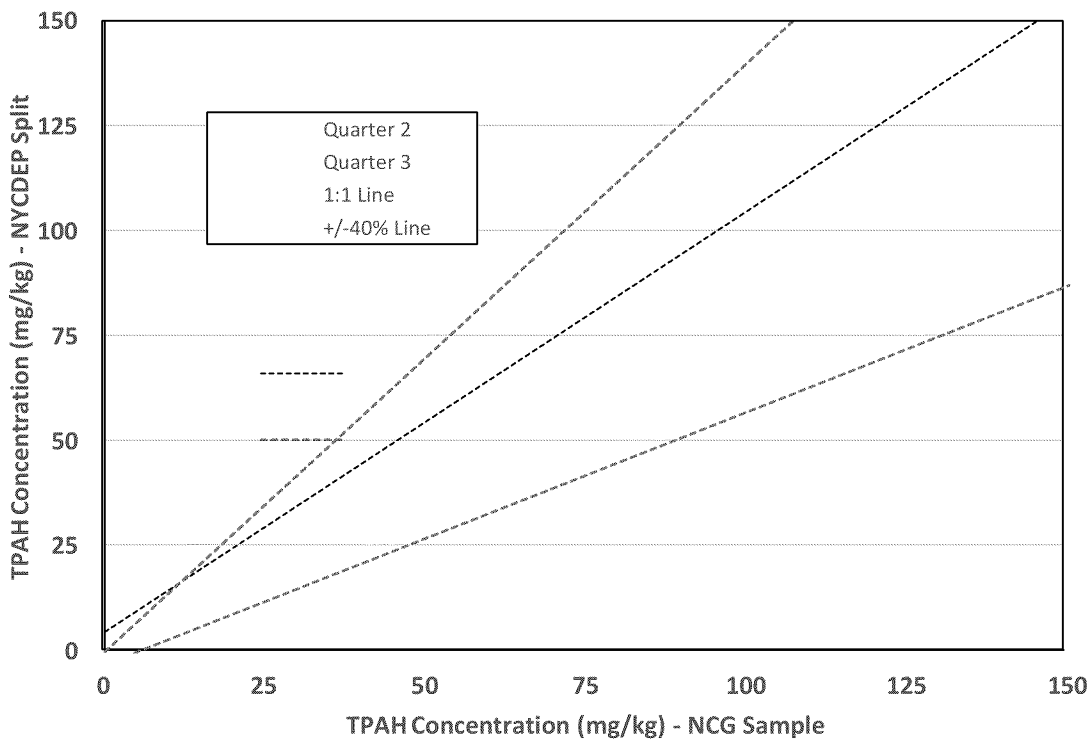


Percent Deposition of East River Fines to Total Fines

East River is a dominant source of fines to the Turning Basin

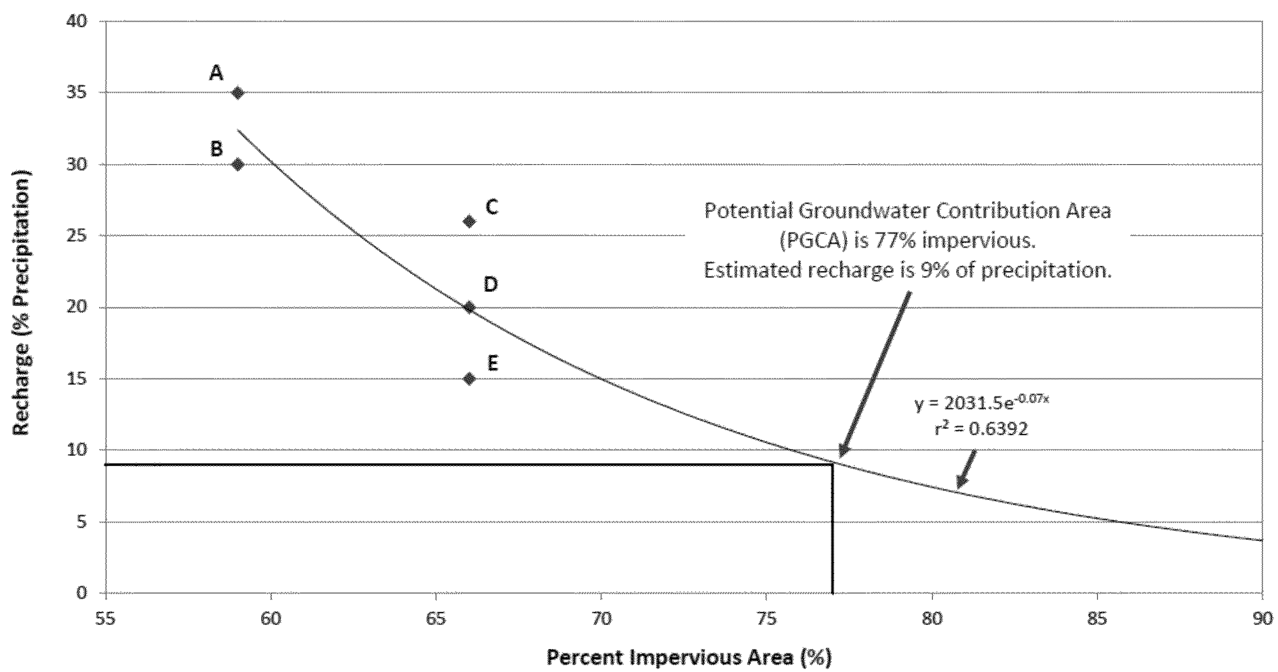
Mischaracterization of Impact of Point Sources

- Comparison of split sample data from sediment traps:
  - The City collected 9 split samples from NCG sediment traps.
  - Quarter 2 – 5 split samples, Quarter 3 – 4 split samples.
  - Split samples in quarter 2 show a bias.
    - NCG samples are biased high compared to NYCDEP split samples for quarter 2., Three of the 5 samples are higher than the +/- 40% acceptable range of difference.
    - This is the Quarter where the TPAH samples in the traps are consistently elevated.
    - One EPA split sample available for quarter 2 shows that NCG result for TPAH is s 58% higher than EPA result.
  - NCG Quarter 2 TPAH data are not reliable and should be investigated.



NCG's Groundwater CSM is Flawed – Water Balance

NYC Environmental Protection



Notes:
A = 59% impervious ~ 30% precipitation (Buxton and Smolensky 1999)
B = 59% impervious ~ 35% precipitation (Buxton and Shernoff 1995)
C = 66% impervious ~ 26% precipitation (Misut and Monti 1999)
D = 66% impervious ~ 20% precipitation (Buxton and Smolensky 1999)
E = 66% impervious ~ 15% precipitation (Buxton and Shernoff 1995)

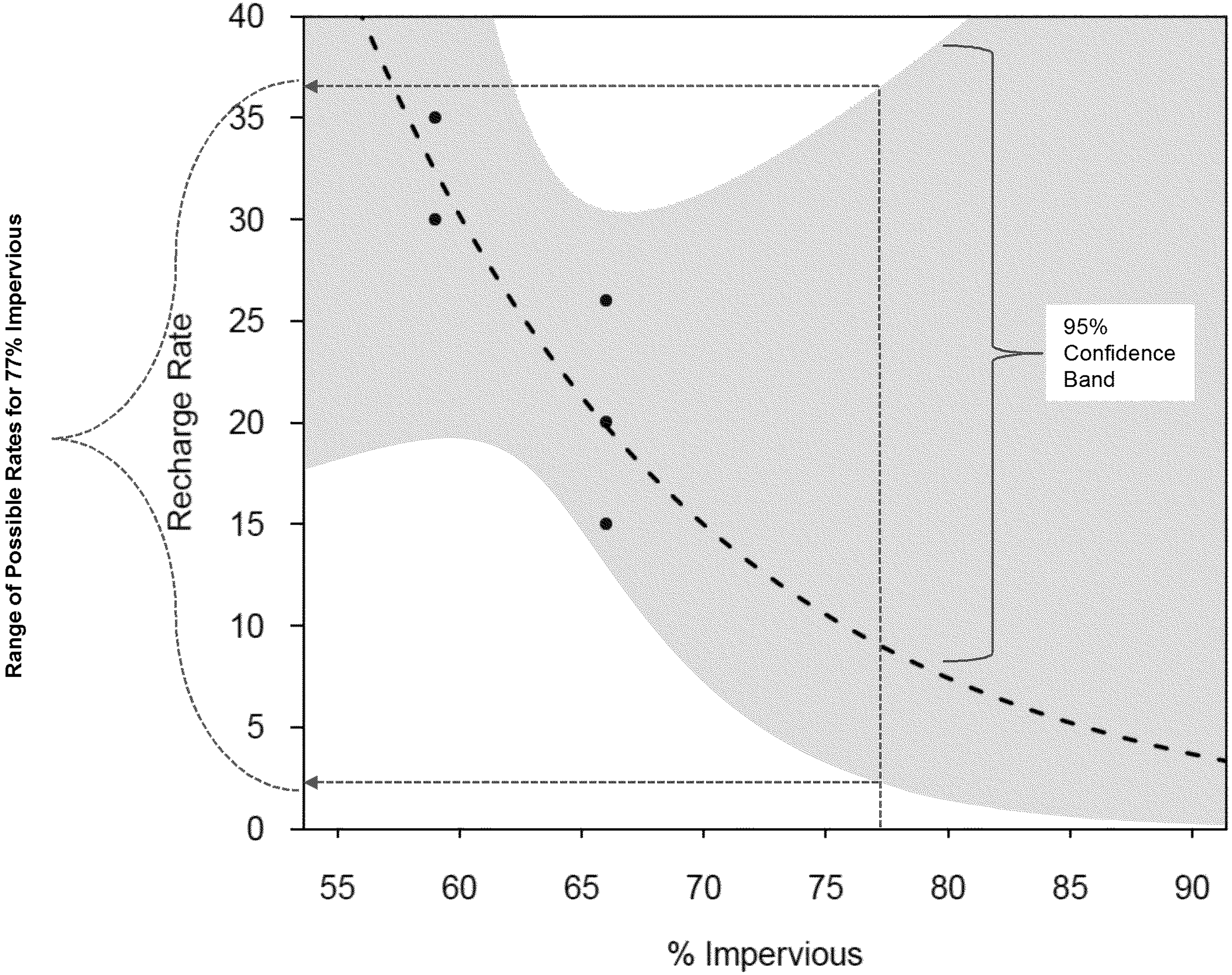
ANCHOR QEA

DRAFT

Figure F5-1
Estimation of Recharge from Precipitation Based on Percent Impervious Area
Groundwater Evaluation
Newtown Creek RI/FS

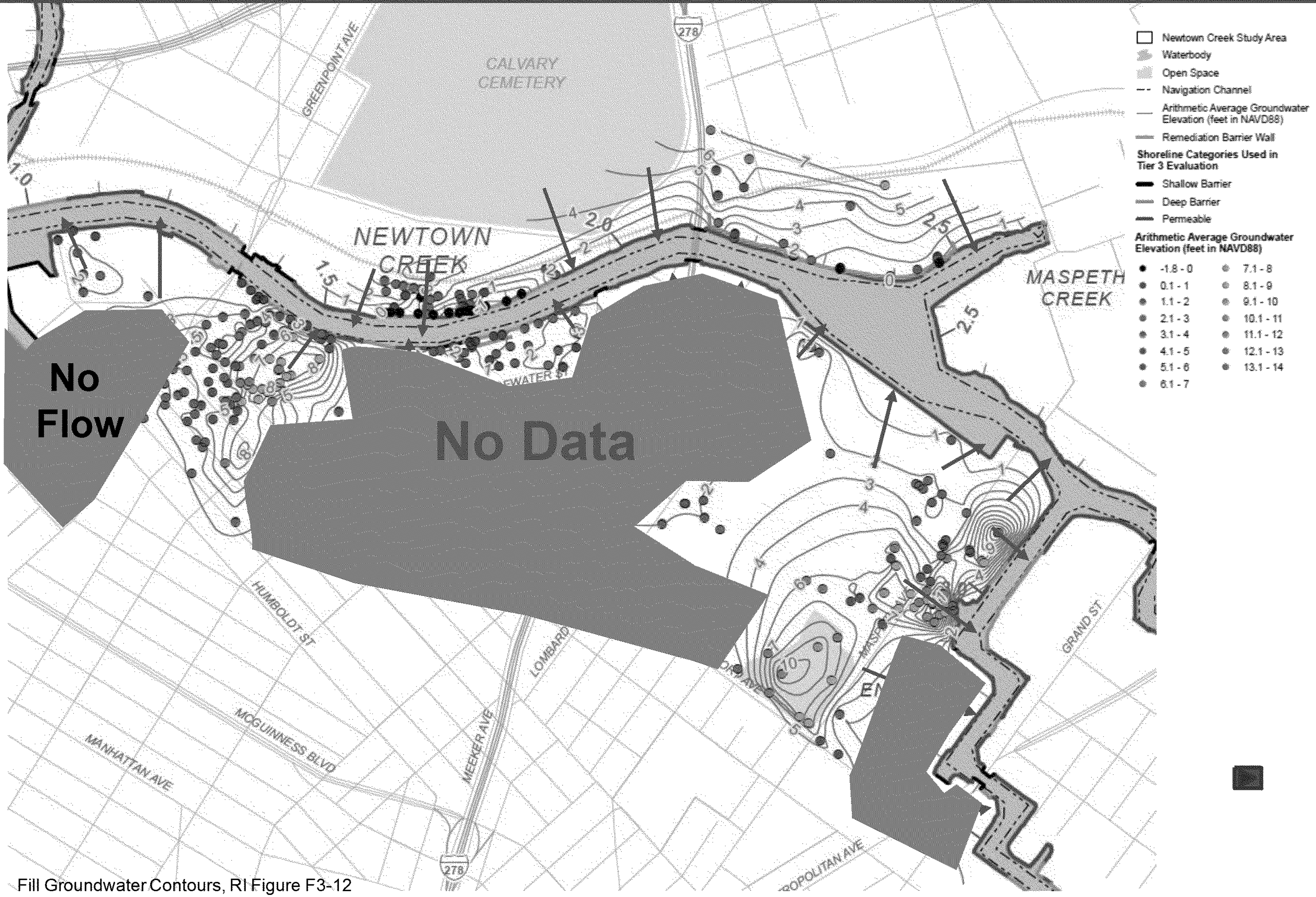
- **NCG uses report summary values instead of discrete values used by the USGS in their models which are available for the Newtown Creek Area.**
- **NCG's extrapolation outside of the data has very large uncertainty and little meaning.**

NCG's Groundwater CSM is Flawed – Water Balance



- 95% confidence bands for NCG's regression show that at "77% Impervious", the possible recharge rate ranges from 2.3 and 36.3%, making NCG's 9% arbitrary.
- Based on USGS's calibrated modeled recharge (varied by location) and long-term monitoring, recharge is about 25% of precipitation in the Newtown Creek area.

Data collected by NCG is Flawed – Slug Tests



Fill Groundwater Contours, RI Figure F3-12

Flow through the banks (⟶) is also shown by NCG's fill groundwater contour map.